02-8810-71-PA
REV. NO. 0

FINAL DRAFT
PRELIMINARY ASSESSMENT
IBM Country Club
POUGHKEEPSIE, NEW YORK

PREPARED UNDER

TECHNICAL DIRECTIVE DOCUMENT NO. 02-8810-71
CONTRACT NO. 68-01-7346

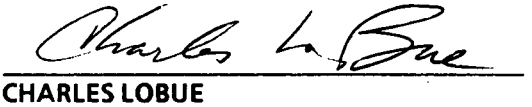
FOR THE

ENVIRONMENTAL SERVICES DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

JANUARY 31, 1989

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY:



CHARLES LOBUE
PROJECT MANAGER

REVIEWED/APPROVED BY:

THOMAS VARNER
SITE MANAGER

RONALD M. NAMAN
FIT OFFICE MANAGER

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT

PART I: SITE INFORMATION

1. Site Name/Alias IBM Country Club
   Street Route 9 (South Road)
   City Poughkeepsie State New York Zip 12602
2. County Dutchess County Code 027 Cong. Dist. NY-25
3. EPA ID No. NYD982531907
4. Latitude 41° 38' 36" N Longitude 73° 55' 12" W
   USGS Quad. Poughkeepsie Quadrangle, 1957, photorevised 1982.
5. Owner International Business Machines Corp. Tel. No. (914) 433-1234
   Street Route 9 (South Road)
   City Poughkeepsie State New York Zip 12602
6. Operator Same as owner Tel. No. Unknown
   Street
   City State Zip
7. Type of Ownership
   ☒ Private ☐ Federal ☐ State
   ☐ County ☐ Municipal ☐ Unknown ☐ Other
8. Owner/Operator Notification on File
   ☐ RCRA 3001 Date ☐ CERCLA 103c Date
   ☒ Unknown
9. Permit Information

Permit	Permit No.	Date Issued	Expiration Date	Comments
State Pollutant Discharge Elimination System (SPDES)	NY0005541	June 1, 1985	June 1, 1990	

10. Site Status
    ☒ Active ☐ Inactive ☐ Unknown
11. Years of Operation 1940s to present
12. Identify the types of waste units (e.g., landfill, surface impoundment, piles, stained soil, above- or below-ground tanks or containers, land treatment, etc.) on site. Initiate as many waste unit numbers as needed to identify all waste sources on site.

Waste Unit No.	Waste Unit Type
1	dry well
2	septic tank

13. Information available from
    Contact Amy Brochu Agency U.S. EPA Tel. No. (201) 906-6802
    Preparer Thomas Varner Agency NUS Corp. Date January 31, 1989

PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following seven items.

Waste Unit No. 1 - dry well

1. **Identify the RCRA permit status, if applicable, and the age of the waste unit.**

   Not Applicable

2. **Describe the location of the waste unit and identify clearly on the site map.**

   This waste unit consisted of a rock-filled dry well located about 5 feet outside of the western wall of the IBM country club maintenance building. A floor drain in this building led to a recessed oil/water separator tank that in turn discharged into the dry well.

3. **Identify the size or quantity of the waste unit (e.g., area or volume of a landfill or surface impoundment, number and capacity of drums or tanks). Specify the quantity of hazardous substances in the waste unit.**

   The dry well was 3 to 5 feet deep, 10 feet wide, and 15 feet long. Its total volume was approximately 600 cubic feet (assuming a constant slope across the bottom). The quantity of hazardous substances deposited is unknown.

4. **Identify the physical state(s) of the waste type(s) as disposed of in the waste unit. The physical state(s) should be categorized as follows: solid, powder or fines, sludge, slurry, liquid, or gas.**

   Liquid

5. **Identify specific hazardous substance(s) known or suspected to be present in the waste unit.**

   Analysis of water samples collected from the dry well on November 20, 1987, revealed the presence of the following contaminants:

   1,1-dichloroethane: 7.5 ug/L
   1,1,1-trichloroethane: 200 ug/L
   toluene: 15 ug/L
   carbon tetrachloride: 27 ug/L
   tetrachloroethylene: 36 ug/L
   acetone: 62 ug/L

6. **Describe the containment of the waste unit as it relates to contaminant migration via groundwater, surface water, and air.**

   There was no containment of this waste unit. Liquid was discharged into the rocks about 1 foot above the water table. Local groundwater flow is toward the nearby Casper Creek. Contaminants could also have volatilized from the recessed oil/water separator tank. (A vent from the tank was identified during excavation on November 20, 1987.)

7. **Identify any miscellaneous spills, dumping, etc. on site; describe the materials and identify their locations on site.**

   A stained area was observed in the vicinity of a gasoline fill pump located at the northwest corner of the maintenance building. A 5- by 5-foot area was excavated to a depth of 1.5 feet on November 20, 1987.

Ref. No. 2

PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following seven items.

Waste Unit No. 2 - septic tank

1. **Identify the RCRA permit status, if applicable, and the age of the waste unit.**

   Not applicable

2. **Describe the location of the waste unit and identify clearly on the site map.**

   This waste unit consists of a septic tank located approximately 15 feet south of the IBM country club maintenance building. The septic tank received drainage from a sink in the maintenance building as well as from bathroom drains. Septic tank effluent ultimately discharged to a leach field approximately 140 feet east of the septic tank.

3. **Identify the size or quantity of the waste unit (e.g., area or volume of a landfill or surface impoundment, number and capacity of drums or tanks). Specify the quantity of hazardous substances in the waste unit.**

   The size of the septic tank as well as the quantity of hazardous substances is unknown.

4. **Identify the physical state(s) of the waste type(s) as disposed of in the waste unit. The physical state(s) should be categorized as follows: solid, powder or fines, sludge, slurry, liquid, or gas.**

   Liquid

5. **Identify specific hazardous substance(s) known or suspected to be present in the waste unit.**

   Analysis of samples collected from septic tank surface and subsurface liquid on November 24, 1987 and November 25, 1987, respectively, revealed the presence of the following contaminants and their corresponding concentrations:

   methylene chloride: 320 ug/L and 120 ug/L
   1,1,1-trichloroethane: 67,000 ug/L and 11,000 ug/L
   1,1-dichloroethane: 7,000 ug/L and 3,300 ug/L

6. **Describe the containment of the waste unit as it relates to contaminant migration via groundwater, surface water, and air.**

   Contaminated effluent was discharged directly into the ground; groundwater is therefore potentially affected. Local groundwater flow is toward the Casper Creek. Volatilization of contaminants into the air from this waste unit is unlikely.

7. **Identify any miscellaneous spills, dumping, etc. on site; describe the materials and identify their locations on site.**

   See previous page.

Ref. No. 2

PART III: HAZARD ASSESSMENT

GROUNDWATER ROUTE

1. **Describe the likelihood of a release of contaminant(s) to the groundwater as follows: observed, alleged, potential, or none. Identify the contaminant(s) detected or suspected, and provide a rationale for attributing the contaminant(s) to the facility.**

   There is a very high potential for a release of 1,1,1-trichloroethane, 1,1-dichloroethane, and toluene to groundwater. These compounds were detected in groundwater samples collected from shallow monitoring well CC-101S, located 10 feet from the dry well, as well as in dry well and other monitoring well samples.

   Ref. No. 2 (Fig. 4-9, Table 3-1)

2. **Describe the aquifer of concern; include information such as depth, thickness, geologic composition, permeability, overlying strata, confining layers, interconnections, discontinuities, depth to water table, groundwater flow direction.**

   Sand and gravel units comprise the aquifer of concern, the most productive source of groundwater in the county. Distinct sand and gravel units may be found in alternating layers that are usually interbedded with layers of silt and clay. The sand and gravel layers are generally less than 25 feet thick but may be as thick as 50 feet. Sand and gravel comprise the principal unconsolidated deposit in an area approximately 4.5 miles long and 1.5 miles wide at its widest point. However, small areas of lacustrine (silt and clay) deposits overlie the sand and gravel, and act as confining layers.

   Immediately above the dolostone bedrock beneath the site is a sand and gravel layer that ranges in thickness from 8 to 32 feet and in permeability from 3×10^{-5} to 2×10^{-3} cm/sec. Overlying this unit is a later of sandy silt 1.5 to 38 feet thick that has a permeability of 4×10^{-5} cm/sec. Above that and extending to the ground surface is a clayey silt unit ranging 0 to 60 feet in thickness and from 1×10^{-6} to 4×10^{-5} in permeability, thus being the less permeable of the two deposits overlying the aquifer of concern.

   Groundwater flow within the sand and gravel layer is to the east and southeast, toward Casper Creek. Groundwater lies 36 feet beneath the ground surface near the location of the dry well.

   Ref. Nos. 2 (pp. 4-1, 4-2, 4-5; Fig. 4-2), 8

3. **Is a designated sole source aquifer within 3 miles of the site?**

   A review of available information indicates that there are no sole source aquifers within 3 miles of the site.

4. **What is the depth from the lowest point of waste disposal/storage to the highest seasonal level of the saturated zone of the aquifer of concern?**

   26 feet. The water level in monitoring well CC-101T was measured at an elevation of 94 feet. The bottom of the dry well was 10 feet below grade, which is at an elevation of 130 feet. Depth = (130-10) - 94 = 26 ft.

   Ref. No. 2 (Fig. 4-2)

5. **What is the permeability value of the least permeable intervening strata between the ground surface and the aquifer of concern?**

   1×10^{-6} cm/sec.

   Ref. No. 2

6. **What is the net precipitation for the area?**

   14 in.

   Ref. No. 3

7. **Identify uses of groundwater within 3 miles of the site (i.e., private drinking source, municipal source, commercial, industrial, irrigation, unusable).**

   Two public supply wells that serve the Village of Wappingers Falls and another two backup supply wells are known to draw water from the aquifer of concern. Another public supply well, owned by the Atlas Water Company, lies 1.75 miles from the site and serves 1,300 people, but its completion depth is not documented. One other municipal and 10 nonmunicipal community water systems (wells) lie within 3 miles of the site and serve a total of 1,934 people, but it is also unknown whether these draw from the aquifer of concern. Commercial, industrial, and irrigational use is not documented. No alternate drinking water supply is currently available in the Village of Wappingers Falls.

   Ref. Nos. 7, 8, 14, 15

8. **What is the distance to and depth of the nearest well that is currently used for drinking or irrigation purposes?**

   Distance 2.55 mi. **Depth** 80 ft

   Ref. No. 8

9. **Identify the population served by the aquifer of concern within a 3-mile radius of the site.**

   There are at least 5,300 people that obtain drinking water from the aquifer of concern (Village of Wappingers Falls public supply).

   Ref. No. 7, 8, 15

SURFACE WATER ROUTE

10. **Describe the likelihood of a release of contaminant(s) to surface water as follows: observed, alleged, potential, or none. Identify the contaminant(s) detected or suspected, and provide a rationale for attributing the contaminants to the facility.**

    There is no potential for a release to surface water. All contaminated waste was discharged beneath the ground surface.

    Ref. No. 2

11. **What is the facility slope in percent? (Facility slope is measured from the highest point of deposited hazardous waste to the most downhill point of the waste area or to where contamination is detected.)**

    Not Applicable

12. **What is the slope of the intervening terrain in percent? (Intervening terrain slope is measured from the most downhill point of the waste area to the probable point of entry to surface water).**

    Not Applicable

13. **What is the 1-year 24-hour rainfall?**

The 1-year 24-hour rainfall is 3.0 inches.

Ref. No. 3

14. **What is the distance to the nearest downslope surface water? Measure the distance along a course that runoff can be expected to follow.**

Not Applicable

15. **Identify uses of surface waters within 3 miles downstream of the site (i.e., drinking, irrigation, recreation, commercial, industrial, not used).**

No drinking water intakes are located within 3 miles downstream of the site along the Casper Creek. Also, this creek is not known to have recreational, industrial, or commercial uses within 3 miles of the site.

Ref. Nos. 7, 10

16. **Describe any wetlands, greater than 5 acres in area, within 2 miles downstream of the site. Include whether it is a freshwater or coastal wetland.**

Not Applicable

17. **Describe any critical habitats of federally-listed endangered species within 2 miles of the site along the migration path.**

Not Applicable

18. **What is the distance to the nearest sensitive environment along or contiguous to the migration path (if any exist within 2 miles)?**

Not applicable

19. **Identify the population served or acres of food crops irrigated by surface water intakes within 3 miles downstream of the site and the distance to the intake(s).**

Not applicable

20. **What is the state water quality classification of the water body of concern?**

Casper Creek is designated as a class C water body by the New York State Department of Environmental Conservation.

Ref. No. 13

21. **Describe any apparent biota contamination that is attributable to the site.**

No biota contamination is documented.

AIR ROUTE

22. **Describe the likelihood of a release of contaminant(s) to the air as follows: observed, alleged, potential, none. Identify the contaminant(s) detected or suspected, and provide a rationale for attributing the contaminant(s) to the facility.**

There is a potential that a small quantity of contaminant vapors may have been released to the air through a vent line from liquid contained in the oil/water separator. Contaminated liquid disposed of in this manner, as determined by analysis of dry well samples, include 1,1-dichloroethane, 1,1,1-trichloroethane, toluene, carbon tetrachloride, acetone, and tetrachloroethylene.

Ref. No. 2

23. **What is the population within a 4-mile radius of the site?**

Approximately 60,700 people.

Ref. No. 12

FIRE AND EXPLOSION

24. **Describe the potential for a fire or explosion to occur with respect to the hazardous substance(s) known or suspected to be present on site. Identify the hazardous substance(s) and the method of storage or containment associated with each.**

No potential for fire or explosion exists since the substances of concern were discharged underground as liquid.

Ref. No. 2

25. **What is the population within a 2-mile radius of the hazardous substance(s) at the facility?**

Approximately 16,700

Ref. No. 12

DIRECT CONTACT/ON-SITE EXPOSURE

26. **Describe the potential for direct contact with hazardous substance(s) stored in any of the waste units on site or deposited in on-site soils. Identify the hazardous substance(s) and the accessibility of the waste unit.**

There is no potential for direct contact since the dry well and the septic tank are underground waste units.

Ref. No. 2

27. **How many residents live on a property whose boundaries encompass any part of an area contaminated by the site?**

None

Ref. No. 9

28. **What is the population within a 1-mile radius of the site?**

Approximatley 8,100 people

Ref No 12

PART IV: SITE SUMMARY AND RECOMMENDATIONS

IBM Country Club consists of an inactive septic system and an inactive, 600-cubic-foot dry well located at the 370-acre IBM country club in Poughkeepsie Township, Dutchess County, New York. The site lies 1.25 miles east of the Hudson River and 850 feet west of the Casper Creek in a commercial/residential section of Poughkeepsie. There are approximately 27,800 people living within 3 miles of the site.

IBM has owned and operated the country club since the 1940s. A maintenance shed at the northern end of the country club property was used to maintain golf carts and groundskeeping equipment. Between 1983 and 1985 the shed was relocated near the southwest corner of the property. During a 1987 inspection of the shed by IBM, a floor drain was discovered that led into a recessed oil/water separator tank. Solvents that had been used to degrease equipment had been hosed off the machinery and allowed to run down the drain and into the tank, along with the dissolved oil and grease. This waste then exited the oil/water separator through a pipe to the dry well, which was discovered by IBM upon excavation of an area next to the shed. Analysis of water samples collected from the well revealed the presence of 1,1,1-trichloroethane, acetone, tetrachloroethylene, toluene, and 1,1-dichloroethane. Notable concentrations of 1,1,1-trichloroethane and 1,1-dichloroethane were found in samples collected from a septic tank that had been connected to a sink in the maintenance shed. The septic tank discharged this waste directly into the ground over an area of approximately 2,900 square feet. The septic tank was subsequently emptied, and the effluent line to the leach field was plugged. In 1988 the old tank was removed and a new one installed. The total quantity of hazardous substances disposed of in the well and the septic tank is unknown.

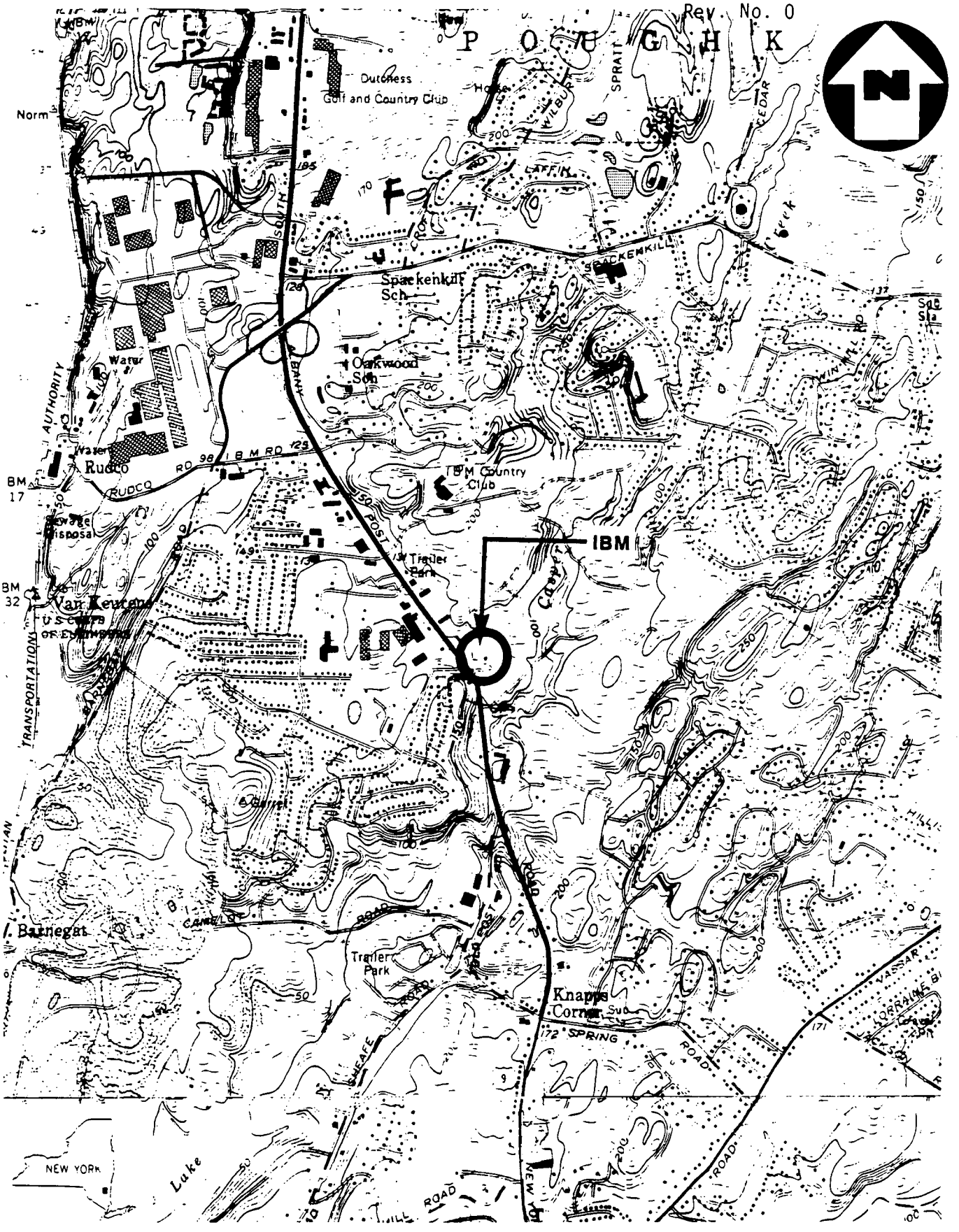
Analysis of groundwater samples collected from monitoring wells near and around the former dry well location showed the presence of several of the compounds that were found in dry well water samples. Groundwater is also potentially affected by septic tank discharge, since low concentrations of trichloroethane were found in groundwater samples collected from monitoring wells near the leach field. No potential for direct contact exists since all hazardous waste was discharged underground.

No cleanup actions other than those conducted by IBM have been initiated, nor are any known to be scheduled. Similarly, no enforcement actions are known to have been taken.

Based on analytical results that show contamination of the aquifer of concern downgradient from the waste units, and the use of this aquifer for drinking water, this site is recommended for a **MEDIUM PRIORITY** site inspection. Off-site, upgradient and downgradient groundwater samples should be collected to either confirm or disprove an observed release.

APPENDIX A

MAPS AND PHOTOGRAPHS



(QUAD) POUGHKEEPSIE, N.Y.

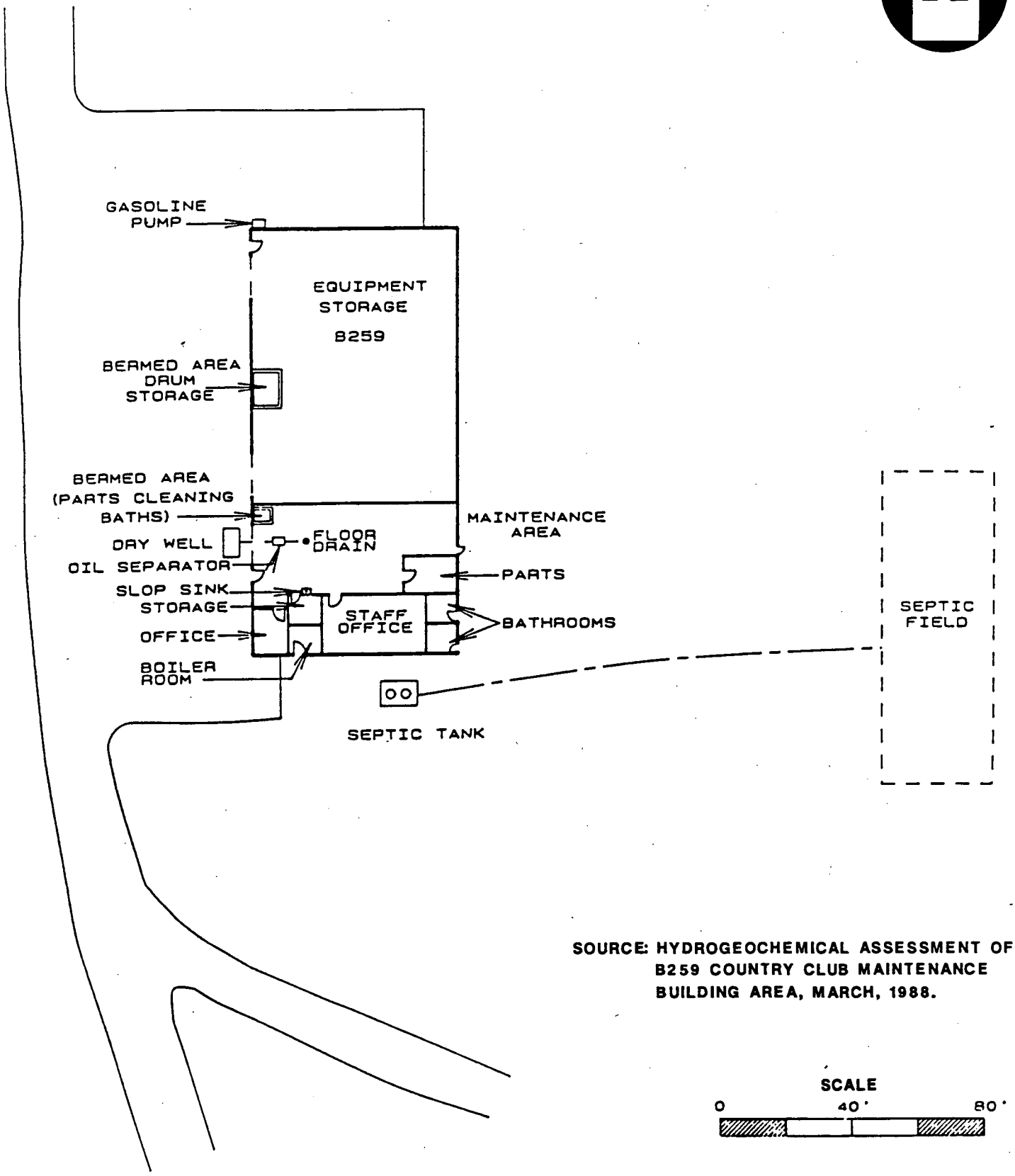
FIGURE 1

SITE LOCATION MAP

IBM COUNTRY CLUB, POUGHKEEPSIE, N.Y.

NUS CORPORATION

SCALE: 1"=2000'



SOURCE: HYDROGEOCHEMICAL ASSESSMENT OF B259 COUNTRY CLUB MAINTENANCE BUILDING AREA, MARCH, 1988.

SCALE
0 40' 80'

FIGURE 2

SITE MAP
IBM COUNTRY CLUB, POUGHKEEPSIE, N.Y.

NUS CORPORATION

IBM COUNTRY CLUB
POUGHKEEPSIE, NEW YORK
NOVEMBER 10, 1988

PHOTOGRAPH INDEX

ALL PHOTOGRAPHS TAKEN BY SUE KENNEDY

Photo Number	Description	Time
1P-1	Looking southeast at entrance to country club.	0943
1P-2	Looking due east at entrance and club buildings.	0943
1P-3	Looking northeast at property.	0944

IBM COUNTRY CLUB, POUGHKEEPSIE, NEW YORK

1P-1 November 10, 1988 0943
Looking southeast at club entrance.

1P-2 November 10, 1988 0943
Looking due east at entrance and club buildings.

IBM COUNTRY CLUB, POUGHKEEPSIE, NEW YORK

1P-3 November 10, 1988 0944
Looking northeast at IBM property.

APPENDIX B

BACKGROUND INFORMATION

REFERENCES

SOURCE

1. NYSDEC, June 1, 1985, New York State Department of Environmental Conservation State Pollutant Discharge Elimination System Discharge Permit, Permit No. NY0005541.

2. Hydrogeochemical Assessment of B259 Country Club Maintenance Building Area. Groundwater Sciences Corporation, Milton Chazen Associates, and Lawler, Matusky, & Skelly Engineers, March 1988.

3. Uncontrolled hazardous waste site ranking system, A user's manual, 40 CFR, Part 300, Appendix A, 1986.

4. Telecon Note: Conversation between Ms. C. Cibelli, Poughkeepsie Town Clerk's Office, and Thomas Varner, NUS Corp., January 3, 1989.

5. Telecon Note: Conversation between Mr. Fred Andros, Supervisor, Poughkeepsie Township Water Department, and Thomas Varner, NUS Corp., January 3, 1989.

6. Telecon Note: Conversation between Mr. Tom Maloney, Poughkeepsie Town Engineer, and Thomas Varner, NUS Corp., January 3, 1989.

7. New York State Atlas of Community Water System Sources, New York State Department of Health, 1982.

8. Simmons, E.T., I.G. Grossman, and R.C. Heath. Ground-water resources of Dutchess County, New York. NYSDEC Water Resources Commission, Bulletin GW-43. Albany, N.Y., 1961.

9. U.S. Department of the Interior, Geological Survey Topographic Map, 7.5 minute series, "Poughkeepsie Quadrangle, N.Y.", 1957, photorevised 1982.

10. Telecon Note: Conversation between Ms. C. Cibelli, Poughkeepsie Town Clerk's Office, and Thomas Varner, NUS Corp., January 17, 1989.

11. New York State Department of Environmental Conservation, Division of Fish and Wildlife, Significant habitat overlay Nos. 1 and 2, "Hartford Quadrangle, CT-NY", March 1981.

12. General Sciences Corporation, Graphical Exposure Modeling Systems (GEMS). Landover, Maryland, 1986.

13. Telecon Note: Conversation between Ms. Terry Harrison, NYSDEC Region 3 Regulatory Affairs Office, and Thomas Varner, NUS Corp., January 18, 1989.

14. Telecon Note: Conversation between Mr. Leo Lowney, Village of Wappinger Falls Clerk, and Thomas Varner, NUS Corp., January 25, 1989.

15. Telecon Note: Conversation between Mr. John Bailey, Village of Wappingers Falls Water Foreman, and Thomas Varner, NUS Corp., January 25, 1989.

16. Off-Site Reconnaissance Information Reporting Form, IBM Country Club, TDD No. 02-8810-71, NUS Corp. Region 2 FIT, Edison, New Jersey, November 10, 1988.

REFERENCE NO. 1

91-20-2 (9/85)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

State Pollutant Discharge Elimination System (SPDES)
DISCHARGE PERMIT
Special Conditions (Part 1)

Industrial Code: 3999
Discharge Class (CL): 03
Toxic Class (TX): T
Major D.B.: 13
Sub D.B.: 01
Water Index No.: H- (Hudson River)

Facility ID Number: NY- 000-5541
UPA Tracking Number: 3-1346-35/76-0
Effective Date (EDP): June 1, 1985
Expiration Date (ExDP): June 1, 1990
Modification Date(s): March 1, 1988
Attachment(s): General Conditions (Part II, XXXX 2/85)

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act, as amended, (33 U.S.C. §1251 et. seq.) (hereinafter referred to as "the Act").

Attn: Michael Mezzio

Permittee Name: International Business Machines Corporation

Street: P.O. Box 950

City: Poughkeepsie State: New York Zip Code: 12602

is authorized to discharge from the facility described below:

Facility Name: International Business Machines Corporation

Location (C,T,V): Poughkeepsie (T) County: Dutchess

Mailing Address (Street): P.O. Box 950

Mailing Address (City) Poughkeepsie State: New York Zip Code: 12602

from Outfall No. 003 at: Latitude 41° 39' 00" & Longitude 73° 56' 30"

into receiving waters known as: Lower Hudson River Class A

and: (list other Outfalls, Receiving Waters & Water Classification)

Outfalls 001, 002, 020, 023, and 024: into Lower Hudson River, Class A; [H-2]

Outfalls 009, 013, 018, 019, and 010 to Spring Book, Class D [H-107]

Outfalls 004, and 017, into Caspar Creek, Class D. [H-105]

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

This permit and the authorization to discharge shall expire on midnight of the expiration date shown above and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for permit renewal as prescribed by Sections 17-0803 and 17-0804 of the Environmental Conservation Law and Parts 621, 752, and 755 of the Departments' rules and regulations.

PERMIT ADMINISTRATOR	DATE ISSUED	ADDRESS
Ralph Manna, Jr.	2/11/88	21 South Putt Corners Rd. New Paltz, NY 12561-1696

Distribution: C. Manfredi/P. Doshna
E. Reilly
R. Hannaford - BWFD
R. Baker - EPA, NY
R. Spear - EPA, NJ
Dutchess Co. Health Dept.

Ralph Manna

SIGNATURE

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the Period Beginning (EDPM) June 1, 1986

and lasting until June 1, 1990

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Gross Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
Outfall 001 Non-Contact Cooling Water:					
Flow	Monitor	Monitor	MGD	Continuous	Meter
BOD, 5-Day (Net)	Monitor	Monitor	mg/l	Weekly	Grab
Temperature	Monitor	105	Deg. F	Weekly	Instantaneo
pH	(6.0 to 9.0)	range	SU	Weekly	Grab
Outfall 002 Non-Contact Cooling Water:					
Flow	Monitor	Monitor	MGD	Continuous	Meter
BOD, 5-Day (Net)	Monitor	Monitor	mg/l	Weekly	Grab
Temperature	Monitor	100	Deg. F	Weekly	Instantaneo
pH	(6.0 to 9.0)	range	SU	Weekly	Grab
Outfall 023 Non-Contact Cooling Water:					
Flow	Monitor	Monitor	MGD	Continuous	Meter
BOD, 5-Day (Net)	Monitor	Monitor	mg/l	Weekly	Grab
Temperature	Monitor	105	Deg. F	Weekly	Instantaneo
pH	(6.0 to 9.0)	range	SU	Weekly	Grab
Outfall 024 Non-Contact Cooling Water:					
Flow	Monitor	Monitor	MGD	Continuous	Meter
BOD, 5-Day (Net)	Monitor	Monitor	mg/l	Weekly	Grab
Temperature	Monitor	105	Deg. F	Weekly	Instantaneo
pH	(6.0 to 9.0)	range	SU	Weekly	Grab

Note: The permit application must list all the corrosion/scale inhibitors, or biocidal-type compounds used by the permittee. If use of new boiler/cooling water additives is intended, application must be made prior to use.

SPECIAL CONDITIONS - INTAKE

The permittee shall develop the following studies and plans for review and approval:

1) Within 60 days of the issuance of this permit modification, the permittee shall develop and submit for approval a proposed impingement study methodology for assessing the impacts of the existing and proposed cooling water intakes. The proposed methodology shall include a schedule of at least one 24 hour collection per week for one year.

2) Within 60 days of the issuance of this permit modification, the permittee shall submit an interim operating plan for the five (5) cooling water intakes. This plan shall identify the methods to be utilized to minimize impingement and entrainment impacts of the cumulative cooling water withdrawl prior to completion of the impingement study and final operating plan. The interim operating plan must ensure that maximum utilization of the Johnson screen intake is employed.

3) Within fifteen months of the approval of the impingement study, the permittee shall submit the final integrated operating plan for the five cooling water intakes. The final plan shall include the following:

   - The results of the data collection program and impingement study.

   - Complete discussion of the methods to be employed to minimize impingement and entrainment throughout the life of the facility.

   - Complete discussion of any proposed mitigation to compensate for fish losses resulting from impingement and entrainment. Consideration must be given to the feasibility of a fish return system or continous screen washing.

Three copies of all reports shall be submitted to the undersigned Permit Administrator within the timeframes specified. Based upon the review of the submitted data, the Department reserves the right to require additional data collection and/or to require additional conditions, operating changes or mitigation, including but not limited to a fish return system or continous screen washing during periods of high impingement, as may be necessary to protect the aquatic resources of the State.

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the Period Beginning (EDPM) June 1, 1986

and lasting until June 1, 1990

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Gross Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
Outfall 003 - Process Water, Cooling Tower Blowdown, and Boiler Blowdown:					
Flow	Monitor	Monitor	gpd	Daily	Calculated
BOD, 5-Day	Monitor	160	lbs/day	Weekly	Grab#
Oil & Grease	Monitor	15	mg/l	Weekly	Grab#
Nitrogen, Ammonia (as N)	Monitor	48	lbs/day	Weekly	Grab#
pH	(6.0 to 9.0)	range	SU	Daily	Grab#
Iron, Total	Monitor	2.0	lbs/day	Weekly	Grab#
Manganese, Total	Monitor	5.0	lbs/day	Weekly	Grab#
Phenolics, Total	Monitor	Monitor	lbs/day	Weekly	Grab#
Cyanide, Total	Monitor	0.68	lbs/day	Weekly	Grab#
Total Aggregate (Note 1)	Monitor	2.0	lbs/day	Weekly	Calculated
Chromium, Total	Monitor	2.0	lbs/day	Weekly	Grab#
Cadmium, Total	Monitor	0.8	lbs/day	Weekly	Grab#
Nickel, Total	Monitor	5.0	lbs/day	Weekly	Grab#
Zinc, Total	Monitor	1.5	lbs/day	Weekly	Grab#
Chromium, Hexavalent	Monitor	0.2	lbs/day	Weekly	Grab#
1,2-dichloroethane	0.2	Monitor	lbs/day	Weekly	Grab#
Silver, Total	Monitor	1.3	lbs/day	Weekly	Grab#
Bis (2-ethylhexyl) Phthalate	Monitor	0.07	lbs/day	Monthly	Grab#
Solids, Settleable	Monitor	0.3	ml/l	Once per batch	Grab
Copper, Total	Monitor	1.36	lbs/day	Weekly	Grab#

The individual mass loadings of each batch discharge shall be added together for each calendar day, to arrive at a "calculated" daily mass loading. Flow measurement shall be by means of a Totalizing Flow Meter or by measurements of the volume of each batch.

Note 1: The parameter "Total Aggregate (Note 1)" shall be calculated as the arithmetic sum of each of the loadings of all 29 Purgeable Halocarbons listed under EPA Method 601; the required samples and analyses shall be done in accordance with EPA Method 601.

Note 2: (Water Treatment Chemicals): The permit application must list all of the corrosion/scale inhibitors, or biocidal-type compounds used by the permittee. If the use of new boiler/cooling water additives is intended, application must be made prior to use.

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the Period Beginning March 1, 1988

and lasting until June 1, 1990

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements: Measurement Frequency	Sample Type
009A Building 012 Foundation Drainage:					
Flow	Monitor	Monitor	gpd	Monthly	Totalizing Met
Total Aggregate (Note 1)	Monitor	Monitor	mg/l	Monthly	Grab
009 Non Contact Cooling Water, Steam Condensate, Building 012 Foundation Drainage, and Stormwater Runoff:					
Flow	Monitor	Monitor	gpd	2/month	Meter
BOD, 5-Day	Monitor	Monitor	mg/l	2/month	Grab
Solids, Suspended	Monitor	Monitor	mg/l	2/month	Grab
Temperature	Monitor	90	Deg. F	2/month	Instantaneous
pH	(6.0 to 9.0) Range		SU	2/month	Grab
Phenolics, Total	Monitor	Monitor	mg/l	2/month	Grab
013 Non-Contact Cooling Water, Stormwater Runoff, Steam Condensate:					
Flow	Monitor	Monitor	gpd	2/month	Meter
BOD, 5-Day	Monitor	Monitor	mg/l	2/month	Grab
Solids, Suspended	Monitor	Monitor	mg/l	2/month	Grab
Temperature	Monitor	90	Deg. F	2/month	Instantaneous
pH	(6.0 to 9.0) Range		SU	2/month	Grab
Ammonia Nitrogen (as NH_3)	Monitor	2.0	mg/l	2/month	Grab
Iron, Total	2.0	4.0	mg/l	Monthly	Grab

Note: 1 The parameter "Total Aggregate (Note 1)" shall be calculated as the arithmetic sum the individual concentrations of all 29 Purgeable Halocarbon Priority Pollutants which shall be analyzed using EPA Method 601.

(The permittee may discharge minor amounts of chiller water drained from the "Chilled Water System", as outlined in the February 1987 Report prepared by Wehran Engineering. Each discharge shall be limited such that temperature does not exceed 90 Deg. F, pH shall be within the range of 6.0 to ~~8~~.0 SU.9.0 The permittee shall perform representative sampling of the chilled water system weekly for pH and temperature to demonstrate compliance with these requirements. The permittee shall report at the time the monthly Discharge Monitoring Report is submitted, weekly sampling results and data concerning the nature, duration, estimated amount and location of each such discharge.

NOTE: (Water Treatment Chemicals): The permit application must list all the corrosion/scale inhibitors or biocidal-type compounds used by the permittee. If the use of new boiler/cooling water additives is intended, application must be made prior to use.

Final EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the Period Beginning June 1, 1985

and lasting until June 1, 1990

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Gross Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
017 Non-Contact Cooling Water, Boiler Blowdown, Stormwater Runoff, Steam Condensate:					
Flow	Monitor	Monitor	gpd	2/month	Meter
BOD, 5-Day	Monitor	Monitor	mg/l	2/month	Grab
Solids, Suspended	Monitor	Monitor	mg/l	2/month	Grab
Temperature	Monitor	90	Deg. F	2/month	Instantaneous
pH	(6.0 to 9.0)	range	SU	2/month	Grab
Chlorine, Total Residual	Monitor	0.4	mg/l	2/month	Grab
2,2-dibromo-3-nitrilopropionamide	Monitor	1.0	mg/l	Monthly	Grab
Sulfite	Monitor	2.0	mg/l	2/month	Grab
Iron, Total	Monitor	0.82	lbs/day	2/month	Grab
004 Swimming Pool Discharge:					
Flow	Monitor	Monitor	gal./batch	Once per batch	Calculated
Chlorine, Total Residual	Monitor	2.0	mg/l	Once per batch	Grab
Solids, Suspended	Monitor	50	mg/l	Once per batch	Grab
018 Surface Runoff from Spill Containment for Oil Storage Tanks, Steam Condensate:					
Flow	Monitor	Monitor	gpd	Monthly	Estimate
Oil & Grease	Monitor	15	mg/l	Once per discharge event	Grab
019 Surface Runoff from Spill Containment for Oil Storage Tanks:					
Flow	Monitor	Monitor	gpd	Monthly	Estimate
Oil & Grease		15	mg/l	Once per discharge event	Grab

(Note: Outfall 004 is an intermittant discharge of water from a swimming pool, which is normally emptied annually. Samples and analysis as required above shall be required only during those reporting periods during which a discharge event occurs.)

(Note: Outfall 019 is an intermittant discharge from a berm around Oil Storage Tanks and Emergency Generators. The monitoring requirements listed here apply only when these Oil Storage Tanks are in use, or when any Emergency Generator is in operation).

020 Steam Condensate - Screenhouse: No Monitoring Required.

Note (Water Treatment Chemicals): The permit application must list all the corrosion/scale inhibitors, or biocidal-type compounds used by the permittee. If the use of new boiler/cooling water additives is intended, application must be made prior to use.

Final EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the Period Beginning June 1, 1985

and lasting until June 1, 1990

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Gross Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
Outfalls 009 and 013 (Pro Rated Average):					
Zinc, Total	Monitor	0.3	mg/l	2/month	Calculated@

@ The concentrations for "Zinc, Total" shall be calculated based on flow measurements and chemical analyses of both outfalls 009 and 013, according to this formula:

$$C_3 = \frac{C_1 \times F_1 + C_2 \times F_2}{F_1 + F_2}$$

C_1 = Concentration of Zinc at Outfall 009
C_2 = Concentration of Zinc at Outfall 013
C_3 = Concentration of Zinc as reported
F_1 = Measured Daily Flow at Outfall 009
F_2 = Measured Daily Flow at Outfall 013

Sum of Outfalls 003 and 009:					
Chloroform	0.38	Monitor	lb/d	Weekly	Calculated*
Phenolics, Total	Monitor	0.36	lb/d	Weekly	Calculated*

*The "Sum of Outfalls" loading for this parameter shall be calculated as the arithmetic sum of the individual loadings at Outfall 003 and 009 respectively. For the purposes of this monitoring requirement, effluent samples shall be taken at outfalls 003 and 009 simultaneously (on the same sampling day). If samples and analysis are only conducted at one outfall on a given sampling day, then the result from that sample shall be considered to be the "daily loading" for that day, for the purpose of determining compliance with the effluent limitations listed here.

FINAL

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the Period Beginning October 1, 1987

and lasting until June 1, 1990

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
001, 002, 003, 009, 013, 017, 023 and 024, Process Wastewater, Cooling Water, and Stormwater Runoff (Pro-rated Composite Sample)					
Effluent Toxicity[a]	Monitor	Monitor[f]	%Effluent[b]	Semiannually[c]	24-hr. Comp.
Copper, Total	Monitor	Monitor	mg/l	Semiannually[c]	24-hr. Comp.
Flow[e]	Monitor	Monitor	gpd	Semiannually[c]	Calculated[e]

(a) "Effluent Toxicity" in this part shall mean the toxicity of the effluent as measured in acute tests specified in "Manual for Toxicity Testing of Industrial and Municipal Effluents", NYSDEC, February, 1985. Both daphnid and fathead minnow acute tests shall be performed, as described on pages VI-6 and VI-10 of the Toxicity Testing Manual. The permittee may use alternate Toxicity Testing Methods, where such methods are approved, in writing in advance, by the Department.

(b) The "LC50" in % Effluent for both daphnid and fathead minnow as defined in "Manual for Toxicity Testing of Industrial and Municipal Effluents" shall be determined and reported.

(c) Discharge Monitoring Requirements for effluent toxicity testing shall apply for the period April 1 through November 30. One test shall be performed during October - November, 1987. The LC50 in % Effluent shall be reported.

(d) For the purposes of the effluent toxicity testing required in this part, a 24-hour flow-proportioned composite sample shall be collected separately and simultaneously (i.e., on the same sampling day), from Outfalls 001, 002, 003, 009, 013, 017, 023 and 024 individually. Individual aliquots from these 24-hour samples shall then be combined into a single "pro-rated composite", by combining aliquots such that the volumes from each 24-hour outfall sample are in proportion to the measured flows at each respective outfall on the same sampling day. The "effluent toxicity" as defined in footnote "(a)" above as well as the chemical analysis for copper required in this part shall be determined on this "pro-rated composite" sample. In addition, the permittee shall attempt to collect the samples required for this "pro-rated composite" on the same sampling day as the samples for the routine chemical analyses at each individual outfall are collected.

(e) This flow shall be calculated as the arithmetic sum of the daily flows from outfalls 001, 002, 003, 009, 013, 017, 023 and 024, during the same sampling day when the "pro-rated composite" samples are collected.

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the Period Beginning October 1, 1987

and lasting until June 1, 1990

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type

001, 002, 003, 009, 013, 017, 023 and 024, Process Wastewater, Cooling Water, and Stormwater Runoff (Pro-Rated Composite Sample):

(f) If the LC50 in % Effluent is less than 100%, the Department may require the permittee to conduct further toxicity testing, or require that the permittee submit a Toxicity Reduction Evaluation (TRE)* study.

(g) Biomonitoring sampling will be waived, and Toxicity Testing deferred, whenever the daily maximum Chloride concentration in the Hudson River exceeds 100 mg/l as a result of a "salt front" intrusion into the Hudson River Estuary, at the IBM-Poughkeepsie intake.

* TRE - The proposed toxicity reduction evaluation, where required by the Department, shall be directed towards identifying the source of the toxicity, describing a procedure to reduce the toxicity to an acceptable level, identifying monitoring parameters suitable for insuring control of the toxicity, and proposing a schedule of compliance.

The TRE, including data, findings, and recommendations for corrective action, permit and self-monitoring shall be submitted in a form similar to a wastewater facilities engineering report.

ACTION LEVEL REQUIREMENTS

The parameters listed below have been reported present in the discharge but at levels that currently do not require water-quality or technology-based limits. Action levels have been established which if exceeded will result in reconsideration of Water Quality and Technology based limits.

Routine action level monitoring results, if not provided for on the Discharge Monitoring Report (DMR) form, shall be appended to the DMR for the period during which the sampling was conducted.

If any of the action levels is exceeded, the permittee shall undertake a short-term, high-intensity monitoring program for this parameter. Samples identical to those required for routine monitoring purposes shall be taken on each of at least three operating days and analyzed. Results shall be expressed in terms of both concentration and mass, and shall be submitted no later than the end of the third month following the month when the action level was first exceeded. Results may be appended to a DMR or transmitted under separate cover to the same addresses. If levels higher than the action levels are confirmed, the results shall constitute a revised application and the permit shall be reopened for consideration of revised action levels or effluent limits.

The permittee is not authorized to discharge any of the listed parameters at levels which may cause or contribute to a violation of water quality standards.

OUTFALL NUMBER & EFFLUENT PARAMETER	Gross ACTION LEVEL	UNITS	MINIMUM MONITORING REQMTS. MEASUREMENT FREQUENCY	SAMPLE TYPE
003 - Process Water, Cooling Tower Blowdown, and Boiler Blowdown:				
Tetrahydrofuran	**0.38**	**lbs/day**	**Semi-Annual**	**Grab**
Xylenes	**0.38**	**lbs/day**	**Semi-Annual**	**Grab**
Benzene	**0.015**	**lbs/day**	**Semi-Annual**	**Grab**
Carbon Tetrachloride	0.38	lbs/day	Semi-Annual	Grab
1,1-dichloroethylene	0.38	lbs/day	Semi-Annual	Grab
Ethylbenzene	0.38	lbs/day	Semi-Annual	Grab
Methyl Chloride	0.38	lbs/day	Semi-Annual	Grab
Toluene	0.11	lbs/day	Semi-Annual	Grab
1,1,2-Trichloroethane	0.38	lbs/day	Semi-Annual	Grab
Antimony, Total	1.0	lbs/day	Semi-Annual	Grab
Mercury, Total	ud*	ug/l	Semi-Annual	Grab
Chlorodibromomethane	0.38	lbs/day	Semi-Annual	Grab
Dichlorobromomethane	0.38	lbs/day	Semi-Annual	Grab
1,2-trans-dichloroethylene	0.38	lbs/day	Semi-Annual	Grab
Bromochloromethane	0.38	lbs/day	Semi-Annual	Grab
1,4-dichlorobutane	0.38	lbs/day	Semi-Annual	Grab
Dichlorofluoromethane	0.38	lbs/day	Semi-Annual	Grab
Butyl benzyl phthalate	0.38	lbs/day	Semi-Annual	Grab
Diethyl phthalate	0.38	lbs/day	Semi-Annual	Grab
Dimethyl phthalate	0.38	lbs/day	Semi-Annual	Grab
Di-n-butyl-phthalate	0.38	lbs/day	Semi-Annual	Grab

* This compound shall be "undetectable" at a detection level of 1.0 ppb.

ACTION LEVEL REQUIREMENTS (continued):

OUTFALL NUMBER & EFFLUENT PARAMETER	GROSS ACTION LEVEL	UNITS	MINIMUM MONITORING REQMTS. MEASUREMENT FREQUENCY	SAMPLE TYPE
009 - Non-Contact Cooling Water, Steam Condensate, Building 012 Foundation Drainage, and Stormwater Runoff:				
Lead, Total	0.50	lbs/day	Semi-Annual	Grab
Methyl Chloride	0.50	lbs/day	Semi-Annual	Grab
Methylene Chloride	0.50	lbs/day	Semi-Annual	Grab
1,2-trans-dichloroethylene	0.50	lbs/day	Semi-Annual	Grab
1,1,1-Trichloroethane	0.50	lbs/day	Semi-Annual	Grab
Trichloroethylene	0.50	lbs/day	Semi-Annual	Grab
N-nitrosodiphenylamine	0.50	lbs/day	Semi-Annual	Grab
Dichlorofluoromethane	0.50	lbs/day	Semi-Annual	Grab
Copper, Total	0.10	mg/l	Semi-Annual	Grab
013 - Non-Contact Cooling Water, Stormwater Runoff, Steam Condensate:				
1,1,1-Trichloroethane	0.70	lbs/day	Semi-Annual	Grab
Chromium, Total	0.50	lbs/day	Semi-Annual	Grab
Nickel, Total	1.56	lbs/day	Semi-Annual	Grab
Copper, Total	0.10	mg/l	Semi-Annual	Grab
1,2-trans-dichloroethylene	0.50	lbs/day	Semi-Annual	Grab
Trichloroethylene	0.50	lbs/day	Semi-Annual	Grab
017 - Non-Contact Cooling Water, Boiler Blowdown, Stormwater Runoff, Steam Condensate:				
Copper, Total	0.10	mg/l	Semi-Annual	Grab

and

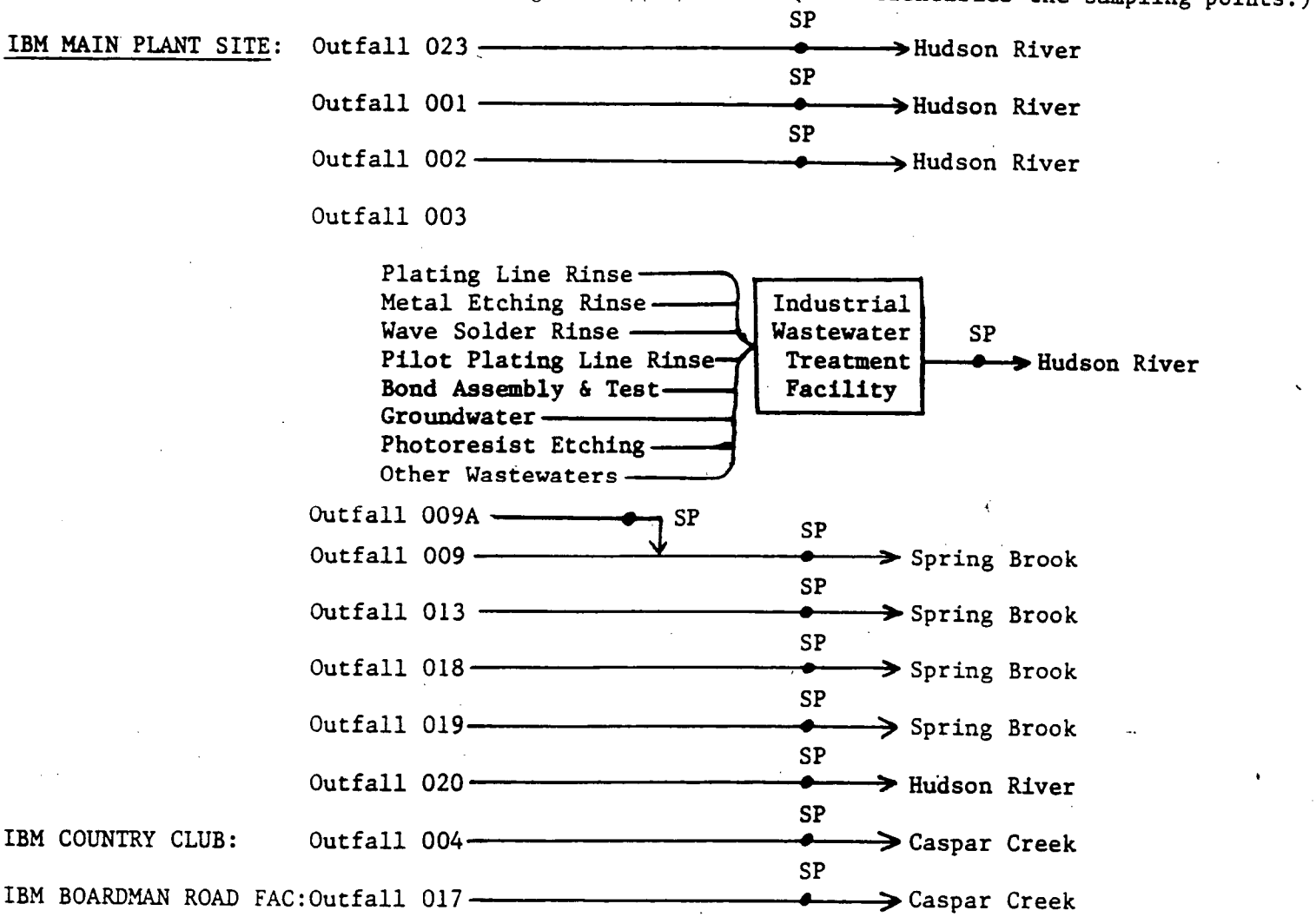
Definition of Daily Average and Daily Maximum

The daily average discharge is the total discharge by weight or in other appropriate units as specified herein, during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by this permit, the daily average discharge shall be determined by the summation of all the measured daily discharges in appropriate units as specified herein divided by the number of days during the calendar month when the measurements were made.

The daily maximum discharge means the total discharge by weight or in other appropriate units as specified herein, during any calendar day.

Monitoring Locations

Permittee shall take samples and measurements to meet the monitoring requirements at the location(s) indicated below: (Show locations of outfalls with sketch or flow diagram as appropriate). ("SP" identifies the sampling points.)



MONITORING, RECORDING AND REPORTING

a) The permittee shall also refer to the General Conditions (Part II) of this permit for additional information concerning monitoring and reporting requirements and conditions.

b) The monitoring information required by this permit shall be:

☐ Summarized, signed and retained for a period of three years from the date of sampling for subsequent inspection by the Department or its designated agent.

☒ Summarized and reported by submitting completed and signed Discharge Monitoring Report forms once every 1 month(s) to the locations specified below. Blank forms available at department offices listed below.

The first report will be due no later than July 28, 1985 .

Thereafter, reports shall be submitted no later than the 28th of the following month(s): Monthly

Department of Environmental Conservation
Regional Water Engineer - Region 3
21 South Putt Corners Road
New Paltz, New York 12561

Dutchess County Department of Health
22 Market Street
Poughkeepsie, New York 12601

Department of Environmental Conservation
Water Division
50 Wolf Road,
Albany, New York 12233

☒ (applicable only if checked)
Dr. Richard Baker , Chief
Permit Administration Branch
Planning & Management Division
USEPA Region II, 26 Federal Plaza
New York, New York 10278

c) If so directed, Monthly Wastewater Treatment Plant Operator's Reports should be submitted to the Regional Engineer and County Health Department or County Environmental Control Agency specified above.

d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

e) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR 136 or as specified in the permit, the results of this monitoring shall be included in the calculations and recording of the data on the Discharge Monitoring Reports.

f) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

g) Unless otherwise specified, all information recorded on the Discharge Monitoring Report shall be based upon measurements and sampling carried out during the most recently completed reporting period.

h) On or after April 1, 1984, any laboratory test or sample analysis required by this permit for which the State Commissioner of Health issues certificates of approval pursuant to section five hundred two of the Public health Law shall be conducted by a laboratory which has been issued a certificate of approval. Inquires regarding laboratory certification should be sent to the Laboratory Certification/Quality Assurance Group, New York State Health Department Center for Laboratories and Research, Division of Environmental Sciences. The Nelson A. Rockefeller Empire State Plaza, Albany, New York 12201.

REFERENCE NO. 2

IBM

Poughkeepsie, New York

HYDROGEOCHEMICAL ASSESSMENT OF B259 COUNTRY CLUB MAINTENANCE BUILDING AREA

Final Report

March 1988

Groundwater Sciences Corporation
Lawler, Matusky & Skelly Engineers
Milton Chazen Associates

CHAPTER 1

INTRODUCTION

IBM, Poughkeepsie, has owned and operated a Country Club since the 1940s at the location shown on Figure 1-1. This facility is about 0.8 mile southeast of the IBM main plant, and comprises an 18-hole golf course, tennis and swimming facilities, a clubhouse, and supporting maintenance facilities. From 1983 to 1985 the Country Club underwent a major renovation, including revisions to the golf course layout, a new clubhouse, and relocation of the maintenance facility; the configuration has not changed since this last renovation.

The 1983-1985 renovation included moving the B259 maintenance building to a new location in the southwestern portion of the Country Club (Figure 1-2). The new facility, still known as B259, has a septic system for sanitary wastes (SPDES No. NY-0142891). The old Building 259 was demolished. Any GW contamination at old B259? Yes .. discussed in report

The new building is used to maintain golf carts and grounds-keeping machinery. In November 1987, in response to a request for operational changes at the building, IBM reviewed the operation, and discovered a floor drain connected to an oil separator, which in turn discharged to a dry well.

IBM immediately reported this situation to the New York State Department of Environmental Conservation (NYSDEC) and began an investigation, which has led to the present report. The report is organized as follows:

Chapter 2 presents relevant background information, including:

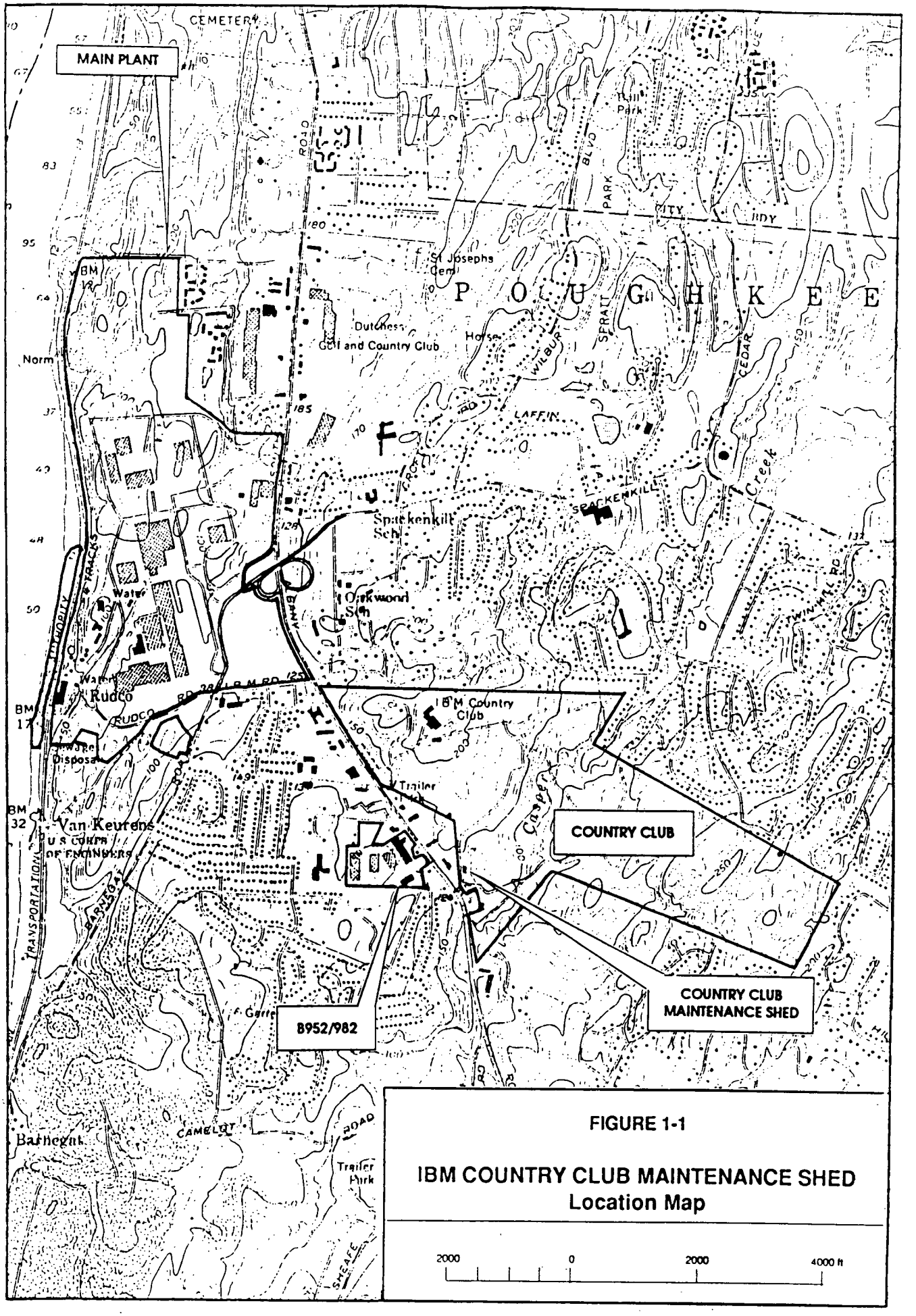
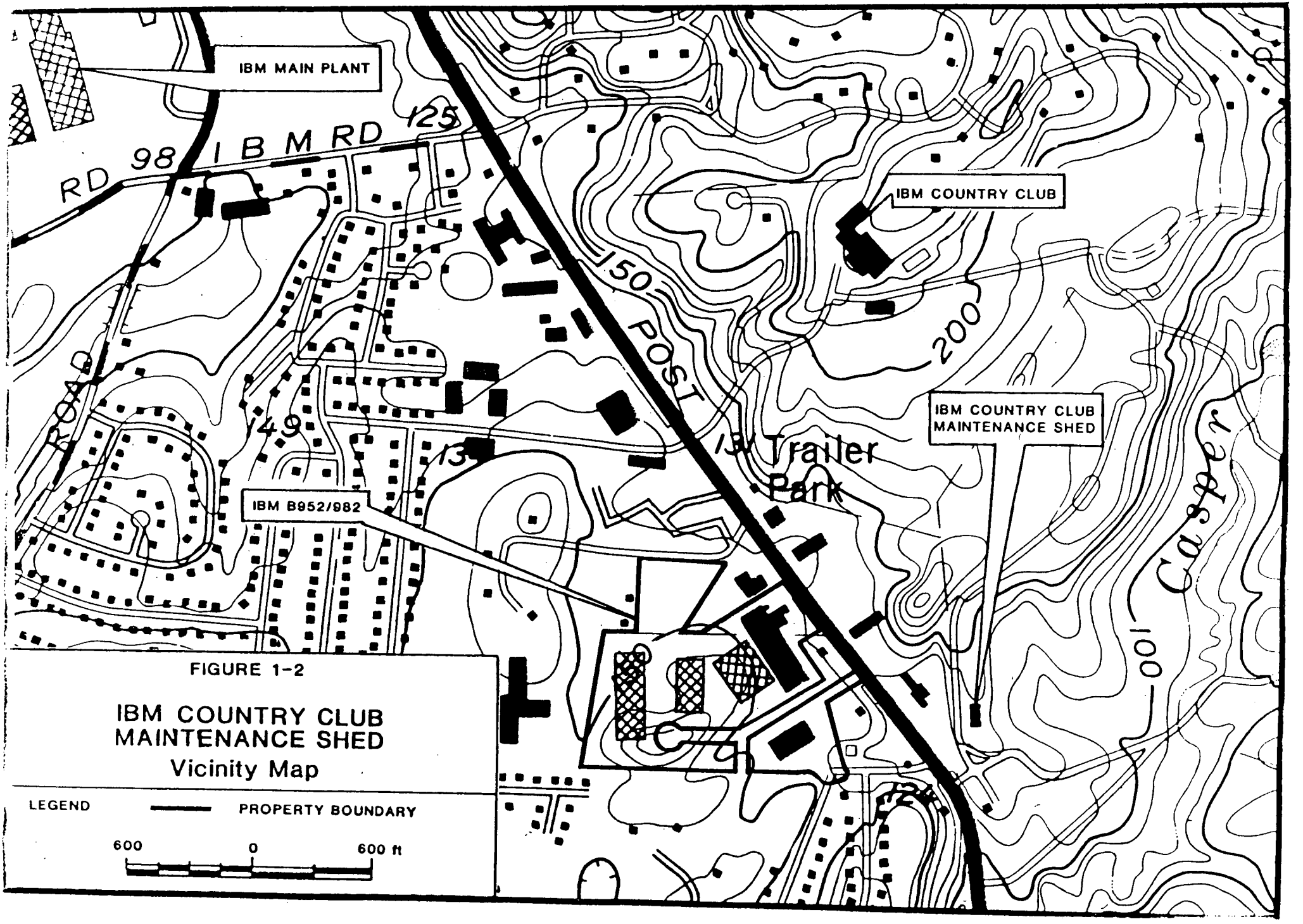


FIGURE 1-1

IBM COUNTRY CLUB MAINTENANCE SHED
Location Map


IBM MAIN PLANT
IBM RD 98
IBM RD
125
150
POST
200
IBM COUNTRY CLUB
IBM COUNTRY CLUB MAINTENANCE SHED
149
13
Trailer Park
IBM B952/982
Casper
100
FIGURE 1-2
IBM COUNTRY CLUB MAINTENANCE SHED
Vicinity Map
LEGEND
PROPERTY BOUNDARY
600
0
600 ft

CHAPTER 3

SOURCE INVESTIGATION AND REMEDIATION

3.1 INTRODUCTION

This section of the report describes the initial investigations that identified the floor drain, the oil separator, the dry well, and the presence of solvent chemicals in both the dry well and the septic tank at B259. Figure 3-1 shows a plan of the B259 site, including those features inside and outside the building pertinent to the investigation. The chronology of events and the remedial actions taken at each stage of the investigation are presented along with a description of the activities at B259 that contributed the solvent chemicals. The source investigation phase covers the period from discovery of the oil separator to initiation of the detailed groundwater and soil investigation described in Chapter 4.

Since 1978, when IBM's corporate groundwater protection plan was initiated at the Poughkeepsie facilities, IBM has used a Remediation Decision Process to guide its response to findings of chemicals in sources and groundwater. The process is diagramed on Figure 3-2. This chapter covers the application of this decision process to the B259 maintenance shed, showing that potential sources of groundwater chemicals were located and removed.

3.2 OIL SEPARATOR/DRY WELL INVESTIGATION

In response to a request from the IBM Country Club maintenance group for approval to install a steam cleaning operation at B259, IBM environmental staff inspected the building on November 12, 1987. During this inspection a floor drain was found, which drained to a tank recessed in the slab floor of the maintenance area.

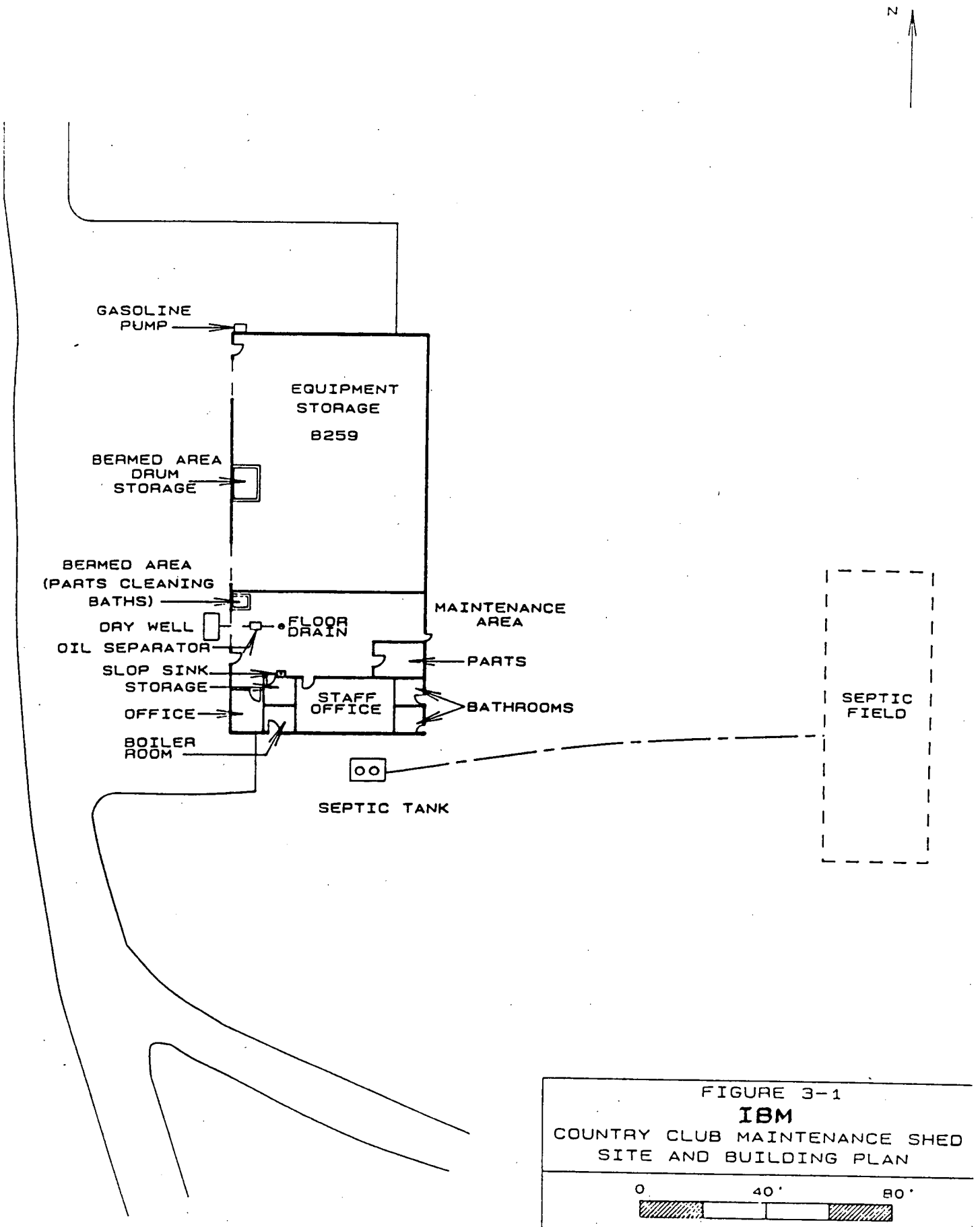


FIGURE 3-1

IBM

COUNTRY CLUB MAINTENANCE SHED
SITE AND BUILDING PLAN

tenance area. The recessed tank contained approximately 30 gal of water with a floating oil layer. Immediately upon discovery of the floor drain and tank, B259 personnel were instructed not to perform any operations that could contribute flow to the floor drain. The contents of the tank were then pumped on November 13, 1987. Since the type of drain installation found at B259 was not typical of IBM designs and all piping was under the slab floor, the IBM personnel who made the discovery could not immediately determine how the system functioned. IBM, therefore, retained an independent consultant [Lawler, Matusky & Skelly Engineers (LMS)] on November 13, 1987, to investigate the design and operation of the drain system at B259. The investigation undertaken by LMS included a site inspection, interviews with B259 operating personnel and construction contractors, a records search, and the review of drawings and permits. LMS began its investigation on November 16, 1987, by inspecting the site and interviewing B259 operating personnel. The tank was found to be empty at that time and remained empty through the rest of the investigation.

Further inspection of the empty tank indicated that it had three chambers, designed to retain floatable oil in the first chamber and settleable material in the second, with overflow to the third chamber. Since all drain piping was in or under the slab floor, the presence of drains or the possible points of discharge from the oil separator could not be determined by inspection. Interviews with construction contractors and review of available drawings did not provide sufficient information to locate drain lines from the oil separator.

Discussions with operating personnel in B259 indicated that standard operating procedures were to catch oil removed from machines and put it in the waste accumulation drum in the bermed containment area. The oil initially observed in the oil separator was con-

cluded to have resulted from oil spills or drips and floor cleaning.

As a result of the above investigation, it was determined on November 19 that excavation was the most direct method to locate the drain lines. On November 20, 1987, the area adjacent to the west side of B259 was excavated and a single discharge connection to a rock-filled dry well was found (see Figure 3-1). The other exit lines from the oil separator were also identified, as a vent and a plugged pipe. There was no connection from the oil separator to the septic tank.

As determined by the excavation, the dry well consisted of 3 to 5 in. stone in a volume approximately 3 to 5 ft in depth, 10 ft in width, and 15 ft in length. The top of the rock was approximately 5 ft below grade, and the 4-in. diameter oil separator discharge pipe projected 5 ft into the dry well 0.5 ft below the top of the rock. The rock immediately in front of the discharge pipe was carefully removed and inspected. There was no sign of oil stain or other discoloration on the rocks or on the soil around the dry well. Clean water was run through the discharge pipe from the oil separator and no oil or other chemical presence was visible.

During excavation of the dry well, water was initially encountered at approximately 6.5 ft below grade, or 1 ft below the discharge pipe. Rock removal was continued from the center of the dry well until soil was encountered at the bottom. After removal of the rock, the water in the excavation was muddy, and small areas with a very slight film were observed. Approximately 250 gal of water was pumped from the excavation to a vacuum truck. At the start of pumping, water flowed rapidly into the excavation from the surrounding dry well rock. After removal of approximately 250 gal, the water level stabilized at approximately 4 ft below the discharge pipe (9.5 ft below grade). After pumping, close inspection

of the remaining water showed small areas (2 to 3 $in.^2$) of surface film. Samples of the standing water, including some surface film, were collected on Friday, November 20, 1987, for expedited analysis of total petroleum hydrocarbons and volatile organic compounds (VOCs).

The NYSDEC regional office (Mr. Shayne Mitchell) was notified of the situation within hours of the excavation on November 20, 1987,* and was also informed that samples were collected and that the oil separator discharge pipe was plugged. Mr. Mitchell indicated that backfilling could proceed without his inspection. The excavation was backfilled with gravel to avoid problems with settling and compaction since the excavation was immediately in front of the garage doors leading to the maintenance area.

The laboratory analysis results were reported orally on Monday, November 23, 1987. As indicated in Table 3-1, the dry well samples contained 1,1,1-trichloroethane (TCA), tetrachloroethylene (PCE), carbon tetrachloride, acetone, toluene, and 1,1-dichloroethane (DCA). No petroleum hydrocarbons were detected, consistent with the visual observations of no stains, described above. These analytical results were the first indication of the presence of solvent chemicals. The low concentrations observed indicate that the quantities of solvent chemical released to the dry well were small (not separate phase product).

NYSDEC (Mr. Shayne Mitchell) was notified of the above results on November 24, 1987, and of IBM's intent to continue the investigation, including sampling the septic tank. IBM also immediately confirmed that all adjacent properties had been connected to town water as described in Section 2.4.

*Appendix D contains copies of all written correspondence with NYSDEC on the B259 investigation.

TABLE 3-1

VOLATILE ORGANIC COMPOUNDS DETECTED IN B259 DRY WELL AND SEPTIC TANK (µg/l)

COMPOUND[a]	DRY WELL 20 NOV 1987 REP-1	DRY WELL 20 NOV 1987 REP-2	SEPTIC TANK 24 NOV 1987 SURFACE	SEPTIC TANK 24 NOV 1987 SUBSURFACE	SEPTIC TANK 25 NOV 1987 SUBSURFACE
Carbon tetrachloride	27	27	ND	ND	ND
1,1-dichloroethane	7.5	7.5	7,000	2,600	3,300
Methylene chloride	ND	ND	320	50	120
Tetrachloroethylene	36	34	ND	ND	ND
1,1,1-trichloroethane	200	190	67,000	7,500	11,000
Toluene	15	14	ND	ND	ND
Acetone	62	ND	NA	NA	NA
Petroleum hydrocarbons (PHC)	ND	ND	NA	NA	NA

[a]All other Method 601/602 volatile compounds were not detected.

ND - Not detected.
NA - Not analyzed.

Note: Complete analytical results in Appendix C-4.

3.3 SEPTIC TANK INVESTIGATION

Based on the detection of solvent chemicals in the dry well, the B259 septic tank, which received drainage from a sink in the maintenance area as well as from bathroom drains, was sampled for VOCs on November 24 and 25, 1987. The results of the septic tank samples were reported within 24 hrs of sample collection. The first sample (November 24, 1987), shown in Table 3-1, was collected from the surface of the septic tank after the tank contents were mixed to check an area where traces of a surface film were observed. The second sample on November 24, 1987, and the November 25, 1987, sample, were collected from the mixed volume of the tank. The latter two samples are considered representative of average concentrations in the tank, while the surface sample indicates higher concentrations in the small areas of surface film. As indicated in Table 3-1, 1,1,1-TCA, methylene chloride, and 1,1-DCA were detected in the three septic tank samples.

The contents of the septic tank were pumped on November 25, 1987, and the solid and liquid fractions separately disposed of at appropriate facilities. The effluent line from the septic tank to the leach field was also plugged on November 25, 1987. The tank was operated as a holding tank for B259 sanitary waste, with no discharge to the leach field, until January 13, 1988, when the septic tank was replaced with a new tank. The septic tank was replaced by IBM to preclude any possible future release of solvent chemical that might desorb from the concrete tank. The original septic tank was disposed of at a secure landfill.

IBM called NYSDEC on December 7, 1987, and the results of the septic tank analyses were given to Mr. Mitchell. NYSDEC was also informed at that time that the effluent line from the septic tank had been plugged and that IBM intended to initiate drilling of monitoring wells.

3.4 GASOLINE FILL AREA

During the preliminary investigation at B259 a small area of stained gravel (4 ft^2) was observed in the vicinity of a gasoline fill pump at the northwest corner of B259. A 5 x 5 ft area was excavated to a depth of 1.5 ft on November 20, 1987. The excavation included approximately 6 in. of gravel and 1 ft of soil. There was no observable staining in the soil below the gravel. The excavated material was drummed for disposal and clean gravel was used to backfill. The gasoline fill area was also included in the groundwater and soil investigation program (Chapter 4).

3.5 SOLVENT CHEMICAL SOURCE INVESTIGATION

Review of the results from the dry well indicated that no petroleum hydrocarbons were detected, indicating that Solvent K, a petroleum distillate in use at B259, had not been released to the dry well. Further investigation revealed the periodic use of aerosol cans of commercially available engine cleaners by contractor maintenance personnel at B259. The cleaners were used to remove oil and grease from grounds-keeping equipment before maintenance was performed. Typically, the cleaners would be applied to a machine directly from the aerosol can, allowed to soak for a period, and then rinsed off with a hose. The rinse water containing the oil and grease and residual solvents was washed into the floor drain and to the oil separator.

The types of cleaners used are available over the counter for home use and contain the solvent chemicals found in both the dry well and the septic tank. The method of use described above, application followed by water rinse, is consistent with the instructions on the labels of these products. This procedure obviously can result in the discharge of small quantities of the unvolatilized solvents and oil and grease with the rinse water. The design of

the oil separator and the septic tank would provide some removal of chemicals by volatilization from the surface and solids removal. Both devices prevent discharge of surface water from the first chamber and provide solids retention.

3.6 ADMINISTRATIVE ACTION

Equipment maintenance activities at B259 were immediately suspended when the solvent chemical were detected in the dry well. Major maintenance activities will be done off-site in the future. No solvent cleaning will be performed at B259. Minor maintenance (oil changes, mechanical adjustments) will continue to be performed, but wastes will continue to be contained for off-site disposal at appropriate facilities. The sink in the maintenance area was removed so that only the bathroom facilities drain to the septic tank.

CHAPTER 4

DETAILED 1987-1988 INVESTIGATION

The purpose of this chapter is to present the results of the subsurface investigation at the Country Club maintenance building. The evaluation included a systematic analysis of the geology, hydrogeology, and the hydrogeochemistry of the site as well as an assessment of the impact of chemical releases on the environment and public health. This investigation and analysis led to conclusions regarding potential impact and recommendations regarding future groundwater quality monitoring at the site. The chapter is organized into three sections: Geology, Hydrogeology, and Hydrogeochemistry. The impact assessment, conclusions, and recommendations are in Chapters 5, 6, and 7, respectively.

The methods used in the drilling program, the horizontal and vertical controls on the monitoring borings, and the boring logs are all in Appendix A.

4.1 GEOLOGY

The drilling program at the Country Club maintenance building (Figure 4-1) indicated the presence of three unconsolidated units overlying dolostone bedrock belonging to the Cambrian Wappinger Group. The site stratigraphy is graphically represented in cross sections A-A' and B-B' (Figures 4-2 and 4-3, respectively). The locations of these cross sections are shown on Figure 4-1. The uppermost unconsolidated unit is a steel gray, massive to slightly interbedded, clayey silt. The unit ranges in thickness at the site from 0 to approximately 60 ft. The clayey silt grades into a sandy silt ranging in thickness from 1.5 ft at boring CC-106T to 38 ft at boring CC-110T where clayey silt is completely absent. These silt deposits are interpreted to be glacial lacustrine sediments.

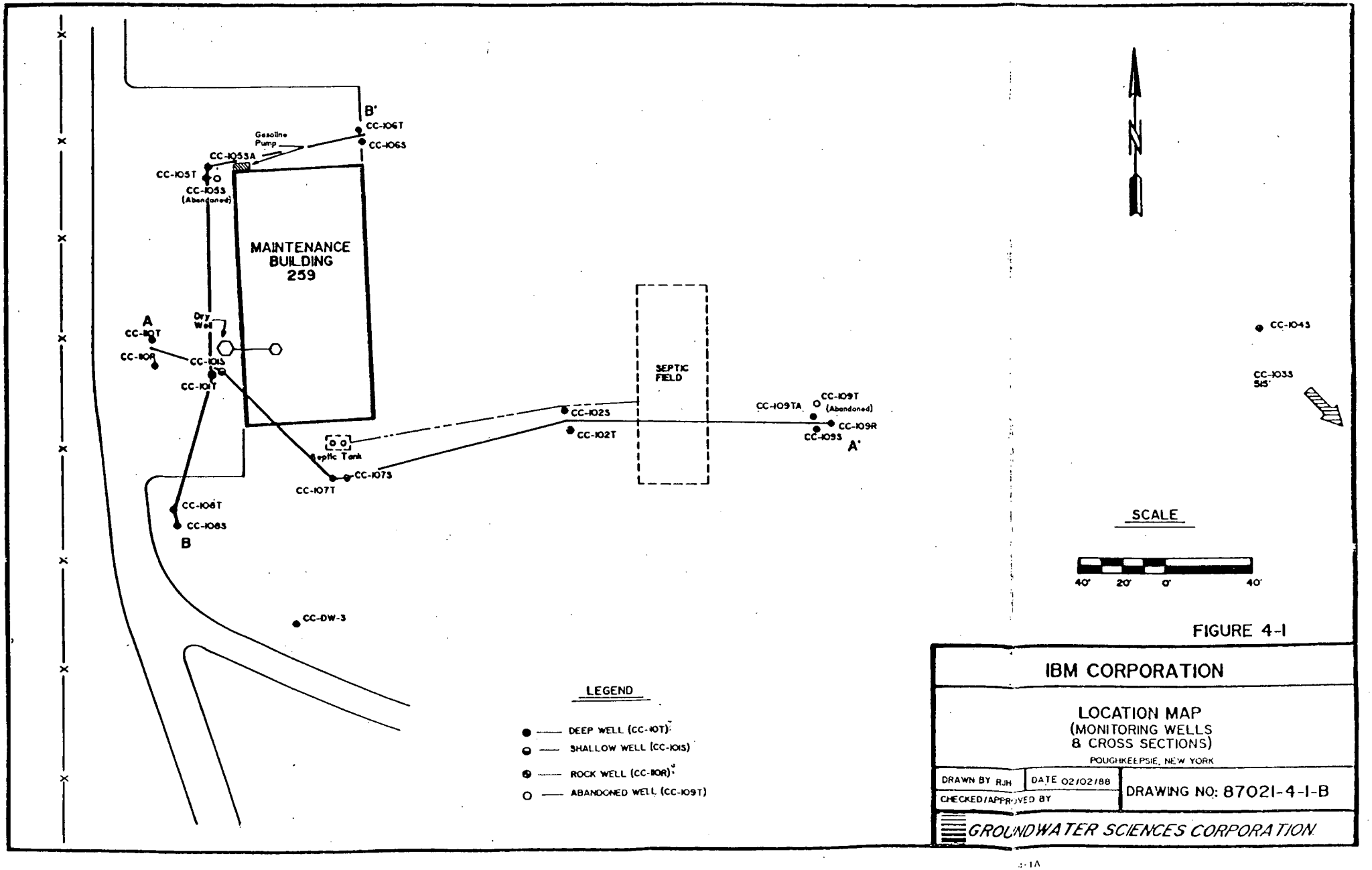


FIGURE 4-1

IBM CORPORATION

LOCATION MAP
(MONITORING WELLS
& CROSS SECTIONS)
POUGHKEEPSIE, NEW YORK

DRAWN BY RJH	DATE 02/02/88
CHECKED/APPROVED BY	DRAWING NO: 87021-4-1-B

GROUNDWATER SCIENCES CORPORATION

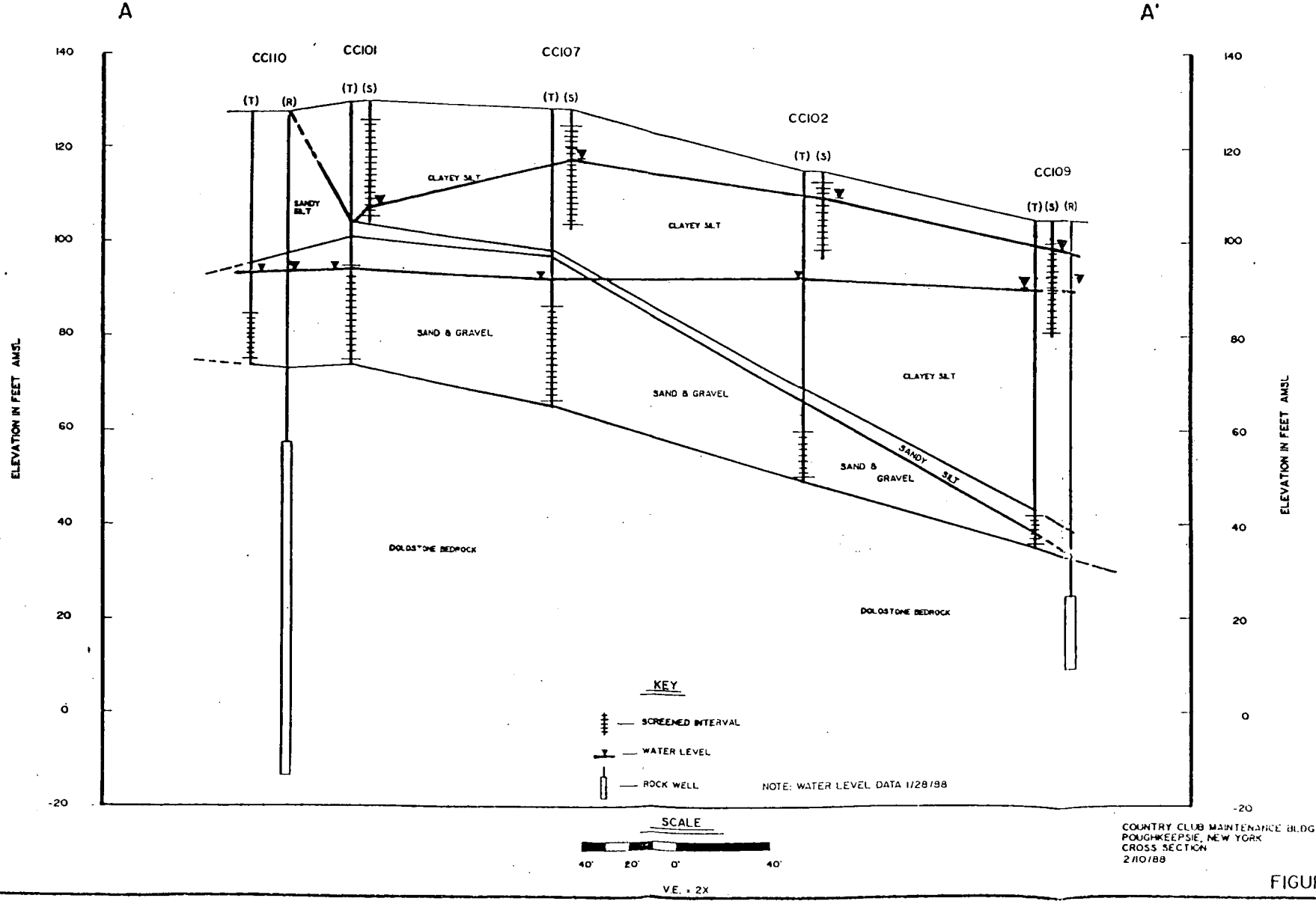

A
A'
CC110
CC101
CC107
CC102
CC109
(T)
(R)
(T) (S)
(T) (S) (R)
CLAYEY SILT
SANDY SILT
SAND & GRAVEL
DOLOSTONE BEDROCK
140
120
100
80
60
40
20
0
-20
ELEVATION IN FEET AMSL
KEY
SCREENED INTERVAL
WATER LEVEL
ROCK WELL
NOTE: WATER LEVEL DATA 1/28/88
SCALE
40' 20' 0' 40'
V.E. = 2X
COUNTRY CLUB MAINTENANCE BLDG
POUGHKEEPSIE, NEW YORK
CROSS SECTION
2/10/88

FIGURE 4-2

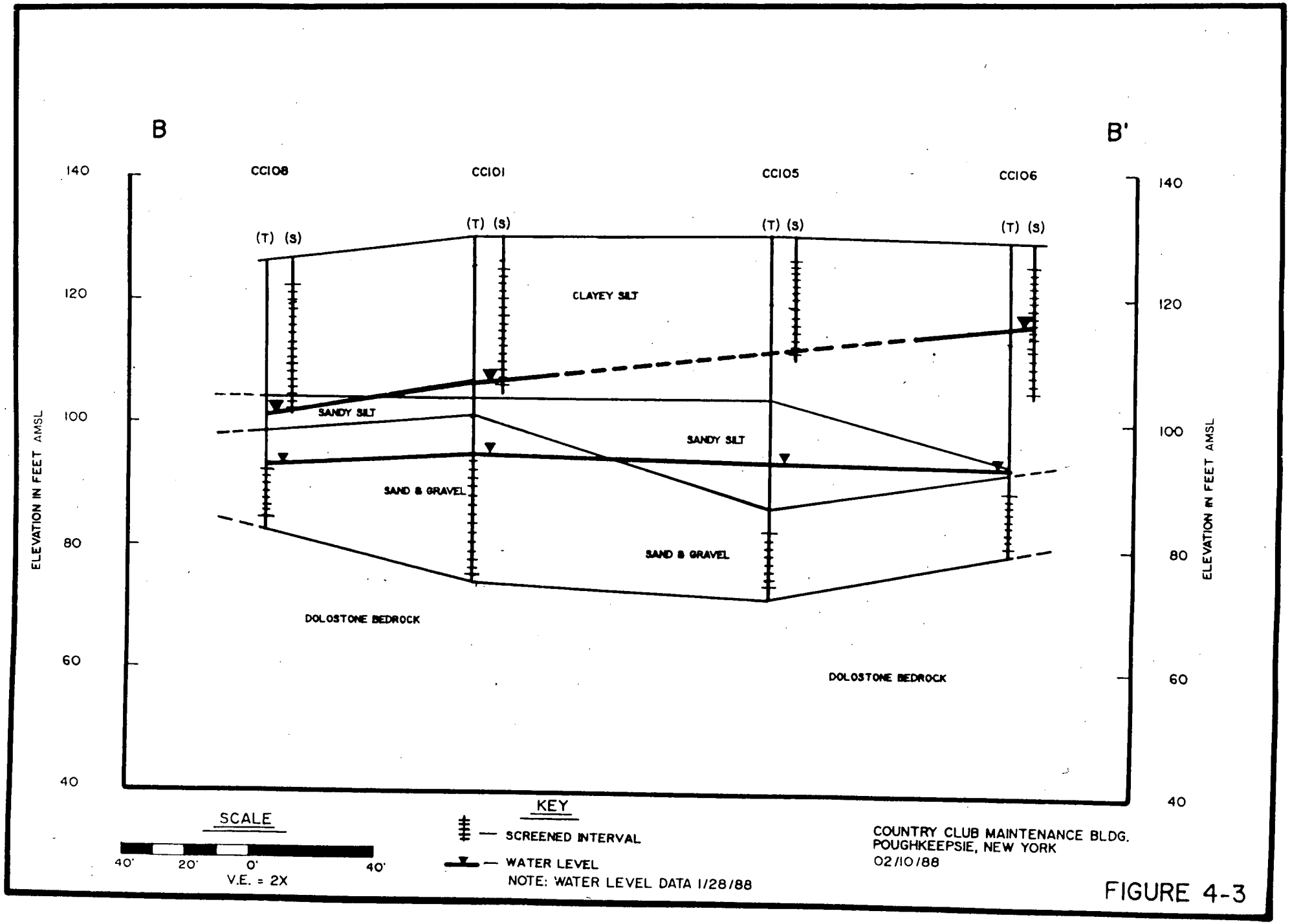

B
B'
CC108
CC101
CC105
CC106
(T) (S)
CLAYEY SILT
SANDY SILT
SANDY SILT
SAND & GRAVEL
SAND & GRAVEL
DOLOSTONE BEDROCK
DOLOSTONE BEDROCK
ELEVATION IN FEET AMSL
140
120
100
80
60
40
SCALE
40' 20' 0' 40'
V.E. = 2X
KEY
— SCREENED INTERVAL
— WATER LEVEL
NOTE: WATER LEVEL DATA 1/28/88
COUNTRY CLUB MAINTENANCE BLDG.
POUGHKEEPSIE, NEW YORK
02/10/88

FIGURE 4-3

Beneath these silt units and overlying the bedrock is a gray-brown sand and gravel unit interpreted to be a glacial outwash deposit. The unit ranges in thickness from approximately 8 to 32 ft; a thickness contour map of the unit shows that the thickness of the sand and gravel unit is greatest beneath the maintenance building, decreasing to the east, north, and west (Figure 4-4).

The bedrock at the site was encountered at varying depths, ranging from approximately 44 to 70 ft. A bedrock elevation contour map is shown in Figure 4-5. The bedrock at the site is generally highly fractured with well-developed solution cavities. The dolostone is blackish-gray in color, fine-grained, and contains many fractures healed by calcite.

4.2 HYDROGEOLOGY

The hydrogeology of the IBM Poughkeepsie Country Club maintenance building site is dominated by three principal subdivisions of the flow system: a low permeability, variable-gradient component associated with the unconsolidated silts; a low-to-medium permeability, low-gradient component associated with the sand and gravel; and a medium permeability, low-gradient component associated with the dolostone bedrock underlying the site. These three subdivisions correspond to the shallow silty unit, the intermediate sand and gravel unit, and the deeper bedrock unit, respectively.

Permeability tests (rising and falling head tests; see Appendix A) performed in on-site monitoring wells, screened in the unconsolidated silts, revealed permeability values ranging from 0.003 to 0.1 ft/day (1E-6 to 4E-5 cm/sec). Those tests performed in on-site monitoring wells screened in the sand and gravel revealed permeability values ranging from 0.1 to 5 ft/day (3E-5 to 2E-3 cm/sec). A list of permeabilities can be found in Table 4-1.

Table 4-1

PERMEABILITY VALUES FOR SELECTED WELLS

WELLS COMPLETED IN THE SHALLOW SILTY UNIT

WELL	RISING HEAD TEST		FALLING HEAD TEST	
	K(cm/sec)	K(ft/day)	K(cm/sec)	K(ft/day)
101S	*	*	2E-6	0.006
102S	4E-5	0.1	*	*
106S	1E-5	0.03	2E-6	0.006
107S	1E-6	0.003	*	*
108S	4E-5	0.1	*	*
109S	3E-5	0.1	*	*

WELLS COMPLETED IN THE SAND AND GRAVEL UNIT

WELL	RISING HEAD TEST		FALLING HEAD TEST	
	K(cm/sec)	K(ft/day)	K(cm/sec)	K(ft/day)
101T	*	*	3E-5	0.1
102T	8E-5	0.2	7E-6	0.02
105T	8E-4	2	6E-4	2
106T	3E-3	9	1E-3	3
107T	*	*	3E-5	0.1
108T	*	*	1E-4	0.3

* No test data

The site topography is the most obvious influence on the recharge and discharge of the shallow silt unit. The difference in head potential between wells CC-101S and CC-109S is related to the surface elevations of the well locations (refer to Figure 4-2).

In the area of wells CC-101S and CC-101T, where the upper silt unit has a high clay content, the saturated zone in the silt is perched above an unsaturated zone in the underlying sand and gravel. Where the unsaturated zone in the upper portion of the sand and gravel does not occur (e.g., CC-102S and CC-109S), there is still a strong vertical gradient between the two units. In areas where the sand content of the silt unit appears to be greater than the clay content (e.g., CC-110T and CC-105T), recharge to the silt unit is transmitted more readily to the underlying sand and gravel. Thus, monitoring well CC-105SA is dry, and the shallow silt layer at CC-110T, which showed no indications of shallow saturation during drilling, did not have a shallow screenable unit.

Finally, the thickness of the clayey silt unit increases significantly from CC-101T toward CC-109T. Where this unit is thicker, the vertical drainage into the sand and gravel unit will be more restricted. This will tend to sustain higher head potential in the shallow unit.

4.2.2 Groundwater Flow Systems

The principal groundwater flow direction in the clayey silt is downward into the sand and gravel. In the eastern portion of the area studied there is a minor component of groundwater movement toward Casper Creek. Within the sand and gravel the principal groundwater component is toward Casper Creek. Within the bedrock unit the principal groundwater flow is southeast toward Casper Creek. Generally, in the western portion of the site, the unit is sandier, the surface elevation is higher, and, where present, the

clayey silt is thinner than it is in the eastern portion of the area studied. Therefore, although there is some development of shallow, perched saturation where the clayey silt is present (CC-101S), the tendency for vertical leakage downward is greater in the western portion of the site.

In the eastern portion of the area studied, behind the maintenance building, the topography is lower, the clay content of the silt is relatively high, and the clayey silt is thickest. Therefore, although there is still a vertical downward gradient between the clayey silt and the sand and gravel, there is also a tendency toward horizontal flow. This is especially apparent in the low area to the east of the septic leach field where shallow groundwater discharges as diffuse seepage to the surface around monitoring well CC-104S.

Groundwater flow in the sand and gravel unit also has both horizontal and vertical components. The horizontal component is to the east and southeast toward Casper Creek (refer to Figure 4-7). The vertical component is variable, depending on the relative head values in the sand and gravel and the underlying bedrock.

The head potential in the sand and gravel unit is slightly higher than that in the rock (CC-110T vs CC-110R) in the western portion of the area studied. Therefore, in this area, there is groundwater movement from the sand and gravel into the bedrock.

In the eastern portion of the area studied, the head potential in bedrock well CC-109R varies in a manner that at times results in vertical groundwater movement from the sand and gravel into the rock; at other times it results in groundwater movement from the rock upward into the sand and gravel. The flow of groundwater from bedrock into the sand and gravel appears to be the dominant condition (refer to Figure 4-2).

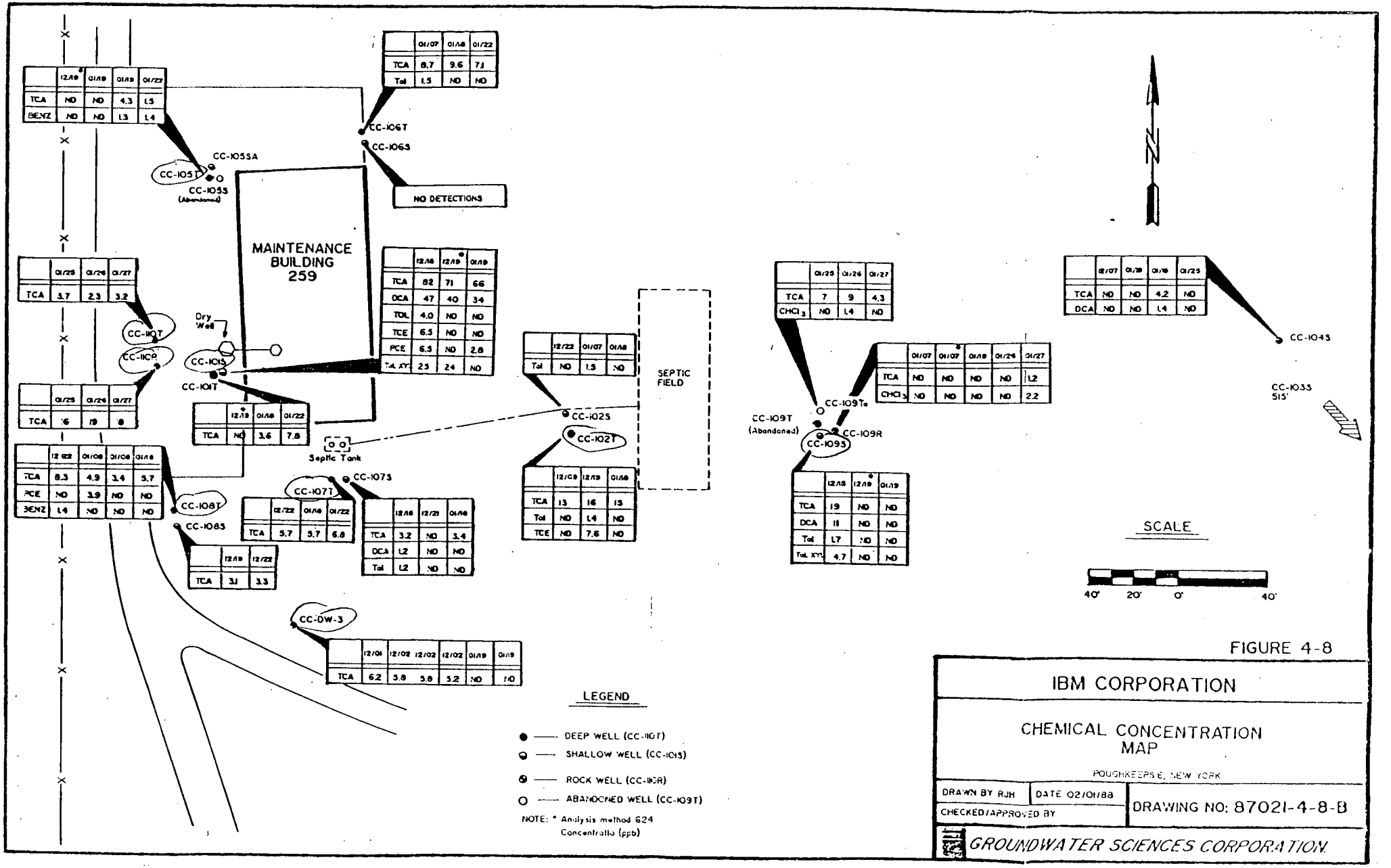


FIGURE 4-8

IBM CORPORATION

CHEMICAL CONCENTRATION MAP

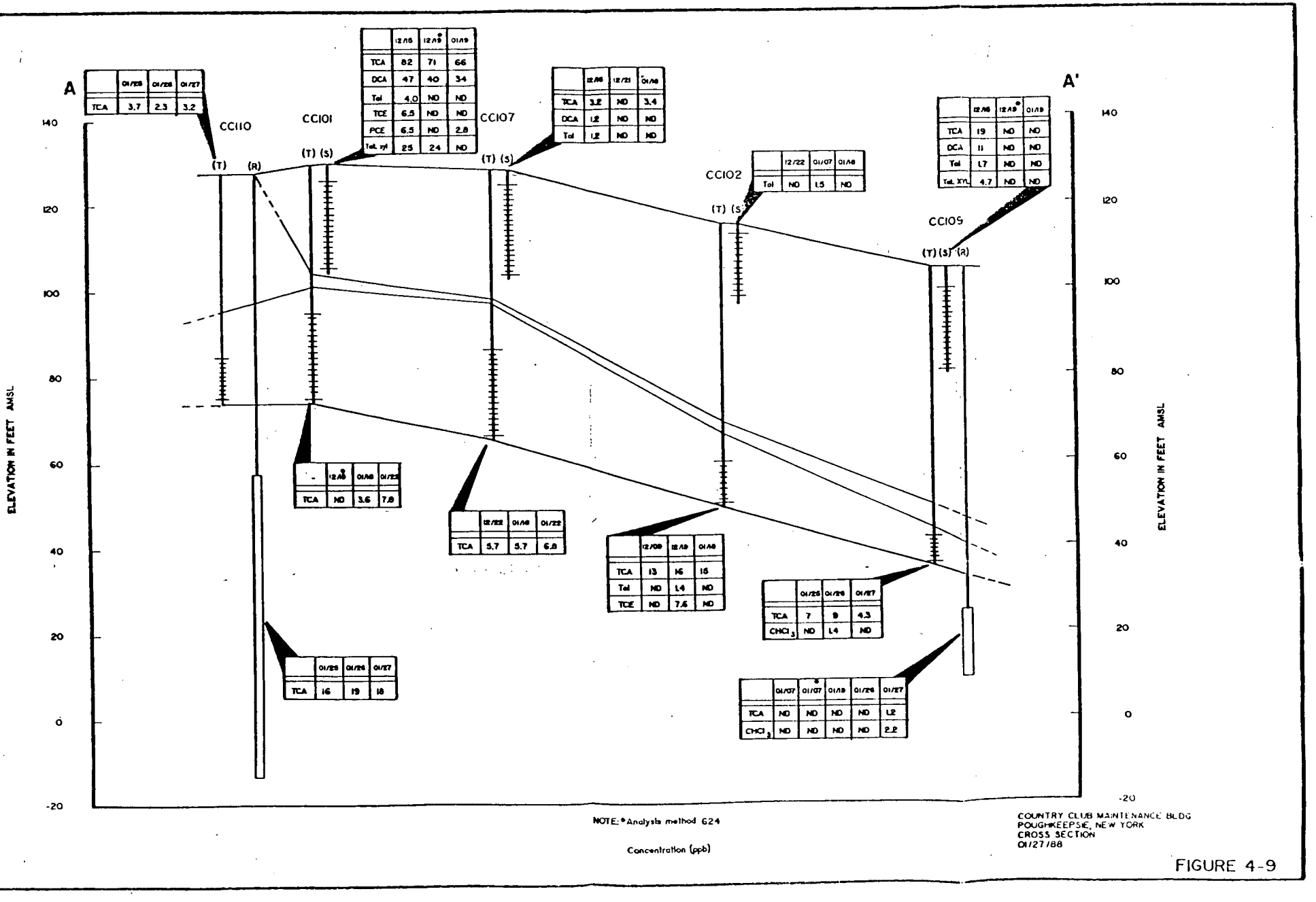
POUGHKEEPSIE, NEW YORK

DRAWN BY RJH | DATE 02/01/88

CHECKED/APPROVED BY

DRAWING NO: 87021-4-8-B

GROUNDWATER SCIENCES CORPORATION

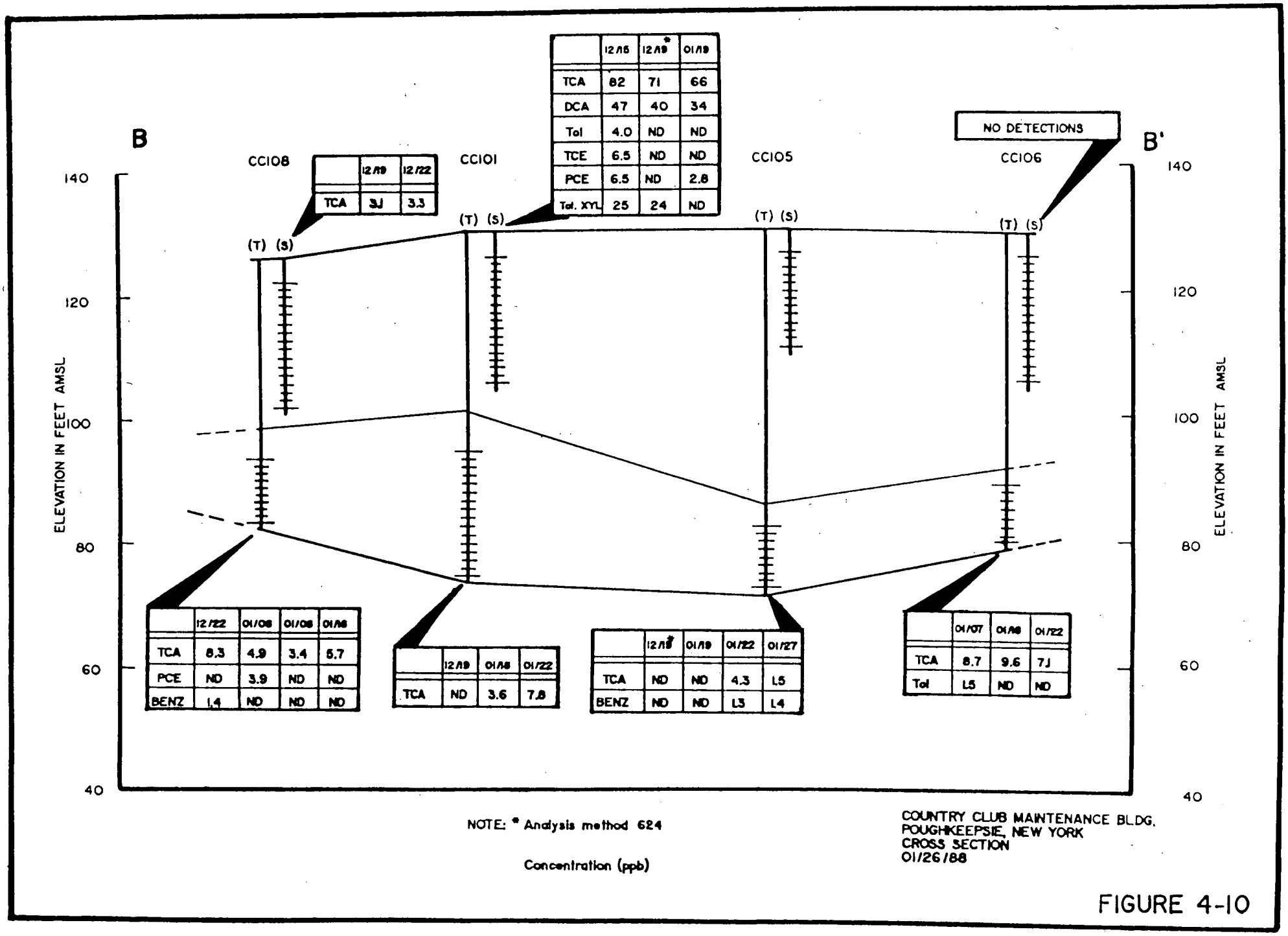


NOTE: *Analysis method 624

Concentration (ppb)

COUNTRY CLUB MAINTENANCE BLDG
POUGHKEEPSIE, NEW YORK
CROSS SECTION
01/27/88

FIGURE 4-9



NOTE: * Analysis method 624

Concentration (ppb)

COUNTRY CLUB MAINTENANCE BLDG.
POUGHKEEPSIE, NEW YORK
CROSS SECTION
01/26/88

FIGURE 4-10

REFERENCE NO. 3

Uncontrolled Hazardous Waste Site Ranking System

A Users Manual

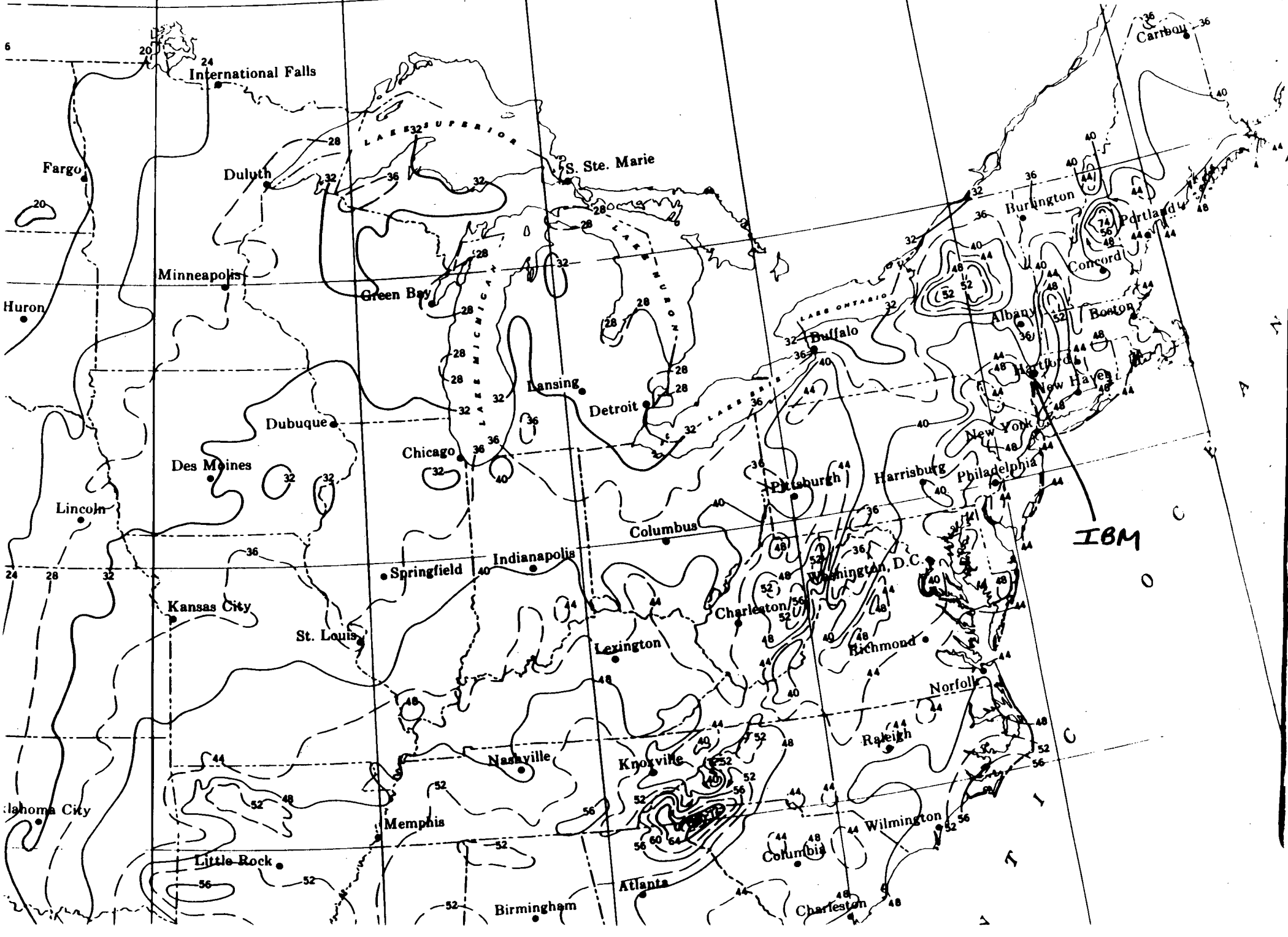
(HW-10)

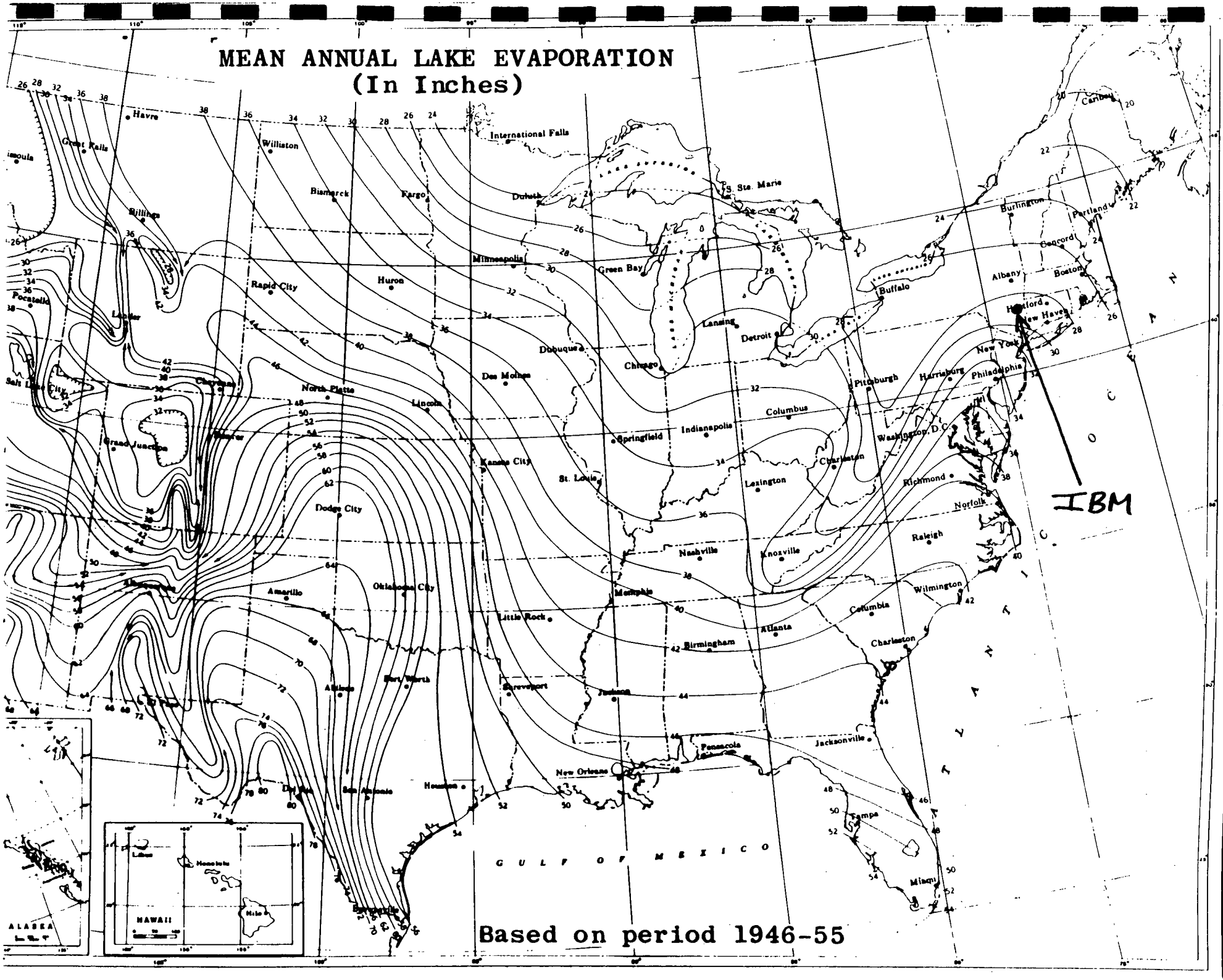
Originally Published in
the July 16, 1982, *Federal Register*

United States
Environmental Protection
Agency

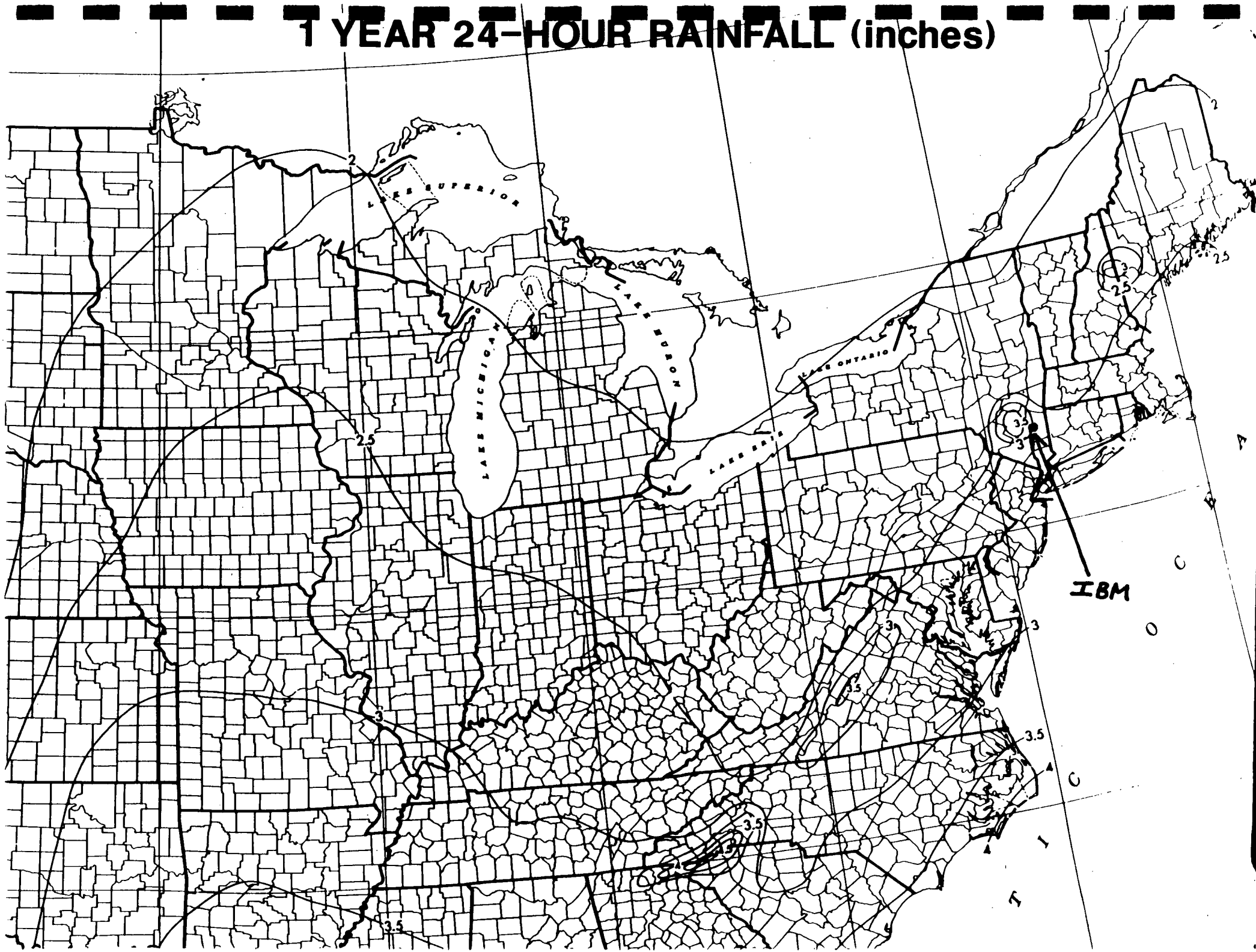
1984

NORMAL ANNUAL TOTAL PRECIPITATION (Inches)




MEAN ANNUAL LAKE EVAPORATION
(In Inches)
Based on period 1946-55
IBM
GULF OF MEXICO
ATLANTIC OCEAN
HAWAII
ALASKA
Havre
Great Falls
Williston
Bismarck
Fargo
International Falls
Duluth
S. Ste. Marie
Billings
Minneapolis
Green Bay
Rapid City
Huron
Dubuque
Chicago
Lander
Pocatello
Salt Lake City
Cheyenne
North Platte
Des Moines
Lincoln
Grand Junction
Denver
Kansas City
Springfield
Indianapolis
St. Louis
Columbus
Pittsburgh
Harrisburg
Philadelphia
New York
Buffalo
Lansing
Detroit
Burlington
Portland
Concord
Albany
Boston
Hartford
New Haven
Dodge City
Amarillo
Oklahoma City
Little Rock
Memphis
Nashville
Knoxville
Lexington
Charleston
Washington, D.C.
Richmond
Norfolk
Raleigh
Wilmington
Columbia
Atlanta
Birmingham
Charleston
Jacksonville
Pensacola
Tampa
Miami
New Orleans
Shreveport
Jackson
Houston
San Antonio
Dallas
Fort Worth
Abilene
El Paso
Carleton

1 YEAR 24-HOUR RAINFALL (inches)



REFERENCE NO. 4

NUS CORPORATION — TELECON NOTE

CONTROL NO:	DATE:	TIME:
02-8810-71	1/3/89	11:45

DISTRIBUTION:

IBM file - COR

BETWEEN:	OF:	PHONE:
Ms. C. Cibelli Town Clerk's Office	Poughkeepsie	(914) 485-3620

AND: Thomas Varner (NUS)

DISCUSSION:

I called the town clerk and told her I was interested in obtaining water use information for Poughkeepsie Twp. She said many people still use private wells, but that some water is purchased from the city (Pough.) for use by Township residents. She said to call Fred Andros, Supervisor of the Poughkeepsie Twp. Water Dept, at (914) 462-6535

TAV 1/3/89

ACTION ITEMS:

REFERENCE NO. 5

NUS CORPORATION — TELECON NOTE

CONTROL NO:	DATE:	TIME:
02-8810-71	~~1/3/88~~ TAV 1/3/89	12:10

DISTRIBUTION:

IBM file - CoR

BETWEEN:	OF:	PHONE:
MR. Fred Andros	Supervisor, Poughkeepsie Twp. Water Dept.	(914) 462-6535

AND: Thomas Varner (NUS)

DISCUSSION:

I told Mr. Andros I was interested in knowing the relative number of people using private wells in Pough. Twp. compared to the number of people using city water. He said there are 10 to 12 thousand city water customers and 4,000 to 6,000 private wells (there are 16,000 properties (approx.) in Poughkeepsie Twp.). He said he didn't know if most private wells were shallow or deep.

ACTION ITEMS:

REFERENCE NO. 6

NUS CORPORATION — TELECON NOTE

CONTROL NO:	DATE:	TIME:
02-8810-71	1/3/89	12:35

DISTRIBUTION:

IBM file - COR

BETWEEN:	OF:	PHONE:
Mr. Tom Maloney	Poughkeepsie Town Engineer	(914) 485-3638

AND:

Thomas Varner (NUS)

DISCUSSION:

Mr. Maloney told me that of the private wells in use in the Twp., only about 100 households use it for drinking. TV 1/3/89 He said city water lines run on every street in the township. He said the population of the township is 40,000 but is expected to rise to 50,000 in 10 years. He said no new private wells are allowed to be drilled as deemed by the Board of Health. ~~Two~~ TV 1/3/89 Standby wells exist which are 600 feet deep. These would be used in the case of an emergency such as a water main break or a city plant emergency. Water from TV 1/3/89 These wells passes through a chlorination system.

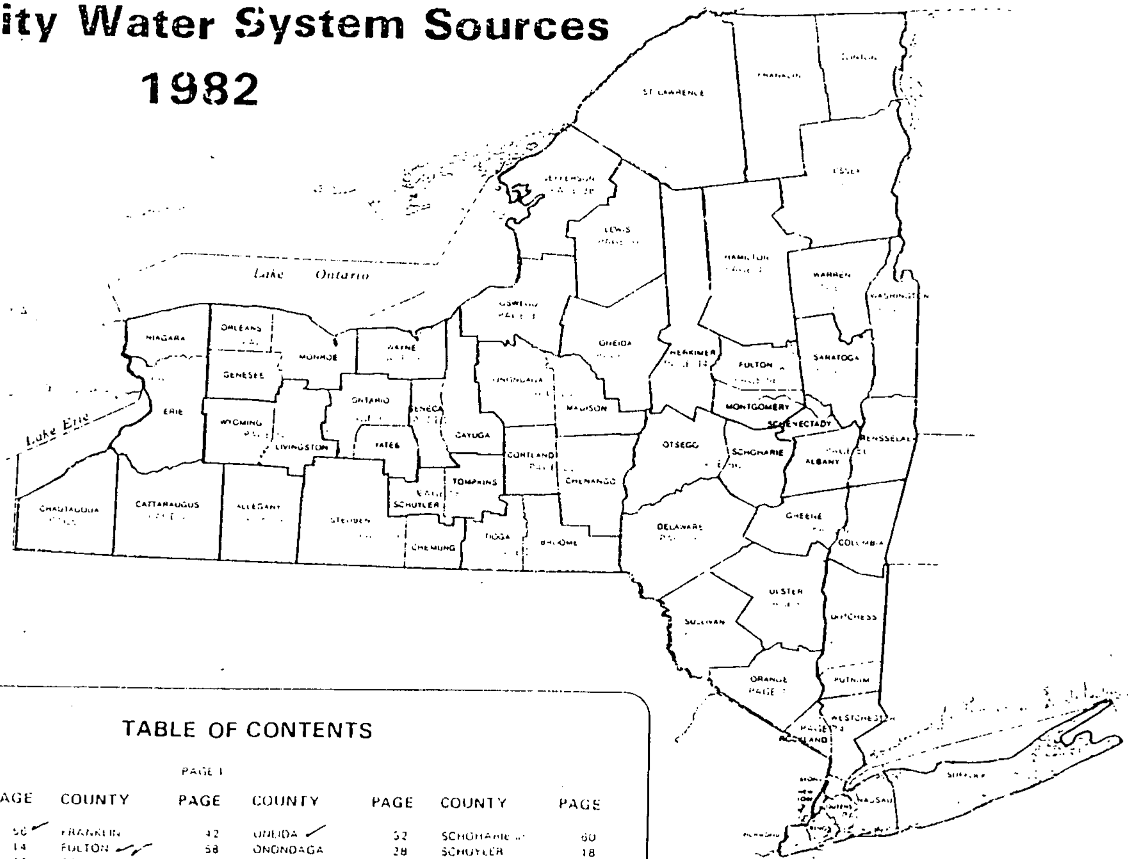
TAV 1/3/89

ACTION ITEMS:

REFERENCE NO. 7

New York State Atlas of Community Water System Sources 1982

NEW YORK STATE DEPARTMENT OF HEALTH



LEGEND

TRANSPORTATION

Highways

Undivided Highway

Interchange

Railroads

Operating

Rest Areas

YONKERS

Levittown

State Campground

State Boat Launching Site

State Canal Park

State Fish Hatchery

Other State Recreation Site

TABLE OF CONTENTS

FOREWARD

SOURCE LOCATIONS

The county maps in this atlas show the locations of surface water intakes and groundwater sources for community water systems in New York State. A community water system is defined in Part 5 of the New York State Sanitary Code as a public water system which serves at least five service connections used by year round residents or regularly serves at least 25 year round residents. Many different types of water systems are therefore included. Community water systems which purchase 100 percent of their water and have no sources of their own are not shown.

Each county map is accompanied by a list of the county's community water systems, population served, and source names. Systems are separated into MUNICIPAL COMMUNITY (program code 100) and NON-MUNICIPAL COMMUNITY (all other program codes) and listed alphabetically within each. MUNICIPAL COMMUNITY water systems are operated by a city, town, village, county or water authority or the water system may be a water district or privately owned. NON-MUNICIPAL COMMUNITY systems are primarily mobile home parks but also include apartments/condominiums, resident health care facilities, resident institutions, and federal facilities.

EXPLANATION OF SYMBOLS

Surface water intakes are designated on the county maps by a triangle (▲) accompanied by the corresponding water supply number.

Ground-water sources are designated by a dot (•) followed by the supply number. Multiple wells separated by less than 1000' and supplying the same water system are shown with one dot. Springs and infiltration galleries are shown as groundwater sources unless the local health unit has designated it a surface source. Therefore, springs and infiltration galleries are listed as wells (spring) or wells (infiltration gallery).

If a Community Water System has source(s) located outside the county, these sources are shown in the county list and show in parentheses the system number, county and page number. Conversely, when a county contains source(s) which supply community water systems located outside the county, the name of the system is also shown in that county's list of sources.

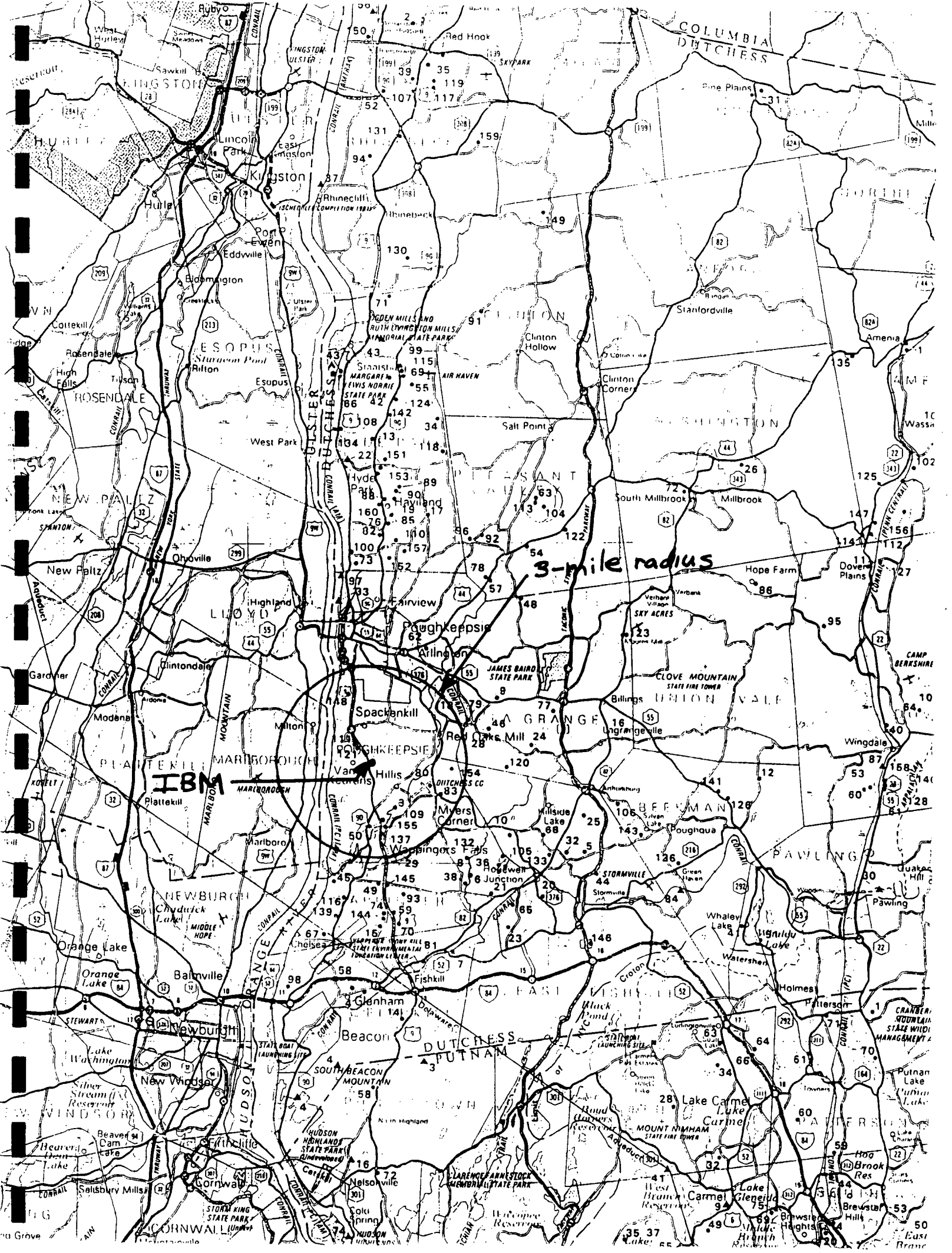
ACKNOWLEDGEMENT

Data compiled in this Atlas is based on location of community water system sources from visits, in 1979, to every county health unit in the State by technicians working for the Bureau of Public Water Supply Protection. This data was updated in 1982 through use of the Department of Health's SAFWATER computer inventory and through limited field review. The Bureau of Public Water Supply Protection wishes to acknowledge the following groups/ boards who have made the Atlas possible:

To the United States Environmental Protection Agency for funding this Atlas as a part of the Underground Injection Control Program.

To the Cartography Section of the New York State Department of Transportation for providing the talent, time and effort in performing the necessary cartographic work to produce this Atlas.

To the engineers and technicians of the Bureau of Public Water Supply Protection of the New York State Department of Health for the painstaking work of gathering the basic data and cross checking it, and for leading this project through to completion.


3-mile radius
IBM

Wells within 3 miles of IBM:

DUTCHESS COUNTY

Municipal Community

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
1	Amenia Water District #1	1000	Wells
2	Annandale Water Company	1000	Wells
3	Atlas Water Company	1100	Wells
4	Beacon City (See also No 1 Putnam Co)	5000	Mt. Beacon & Melzingah Reservoirs, Wells
5	Beekman Country Club	300	Wells
6	Brettview Acres Water Company	920	Wells
7	Brinkerhoff Water Company	3500	Wells
8	Central Wappinger Improvement Area	1800	Wells
9	Deerfield Estates Water District	900	Wells
10	Dogwood Knolls	600	Wells
11	Dover Plains Water Company	1500	Wells
12	Dover Ridge Estates	60	Wells
13	Dutchess Estates Inc	700	Wells
14	Fishkill Village	6000	Wells
15	Fleetwood Manor Water District	850	Wells
16	Grandview Water District	160	Wells
17	Greenfield Water District	1250	Wells
18	Greenmeadow Park Water Company	350	Wells
19	Harbourid Hills Water Company Inc	900	Wells
20	Hopegard, Inc	275	Wells
21	Hopewell Services Inc	900	Wells
22	Hyde Park Fire & Water District	6000	Crum Elbow Creek, Wells
23	Kensington Park Water Company	65	Wells
24	La Grange Club Estates	120	Wells (Infiltration Gallery)
25	Little Switzerland Water Company	600	Wells
26	Millbrook Village	1735	Wells
27	Millerton Village	1600	Wells
28	Noxon Knolls Water District	250	Wells
29	Oakwood Knolls	110	Wells
30	Pawling Village	2000	Pawling Reservoir, Wells
31	Pine Plains Water Company	1060	Wells
32	Pinewood Knolls	265	Wells
33	Poughkeepsie City	30000	Hudson River
34	Quaker Hill Estates Water District	424	Wells
35	Red Hook Village	2000	Wells
36	Revere Park Water Company	560	Wells
37	Rhinebeck Village	4200	Hudson River
38	Rockingham Farms	3000	Wells
39	Rokeby Homes, Inc	184	Wells
40	Schreiber Water Works	110	Wells
41	Shorehaven Civic Association	300	Wells
42	South Cross Road Water Company Inc	572	Wells (Infiltration Gallery)
43	Staatsburgh Water Company	1072	Indian Kill Reservoir, Wells
44	Taconic Estates	185	Wells
45	Tall Trees	250	Wells
46	Titusville Water District	700	Wells
47	Tivoli Village	713	Wells
48	Valley Dale Water Company	380	Wells
49	Wappinger Park Homes	400	Wells
50	Wappingers Falls Village	5100	Wells
51	Willow Lake Water Company	126	Wells
52	Windermere Highlands	175	Wells

Non Municipal Community

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
53	Angels Trailer Park	40	Wells
54	Arbor Arms Apartments	50	Wells
55	Arvans Mobile Court #1	72	Wells
56	Bard College	NA	Sawkill Creek
57	Beckwith Trailer Park	26	Wells
58	BGB Mobile Home Park	137	Wells
59	Birchwood Mobile Home Park	42	Wells
60	Brooks Mobile Home Park	25	Wells
61	Cannons Trailer Park	16	Wells
62	Canterbury Garden Apartments	600	Wells
63	Cedar Hollow Mobile Home Park	90	Wells
64	Cedar Lane Mobile Home Park #2	28	Wells
65	Charlotte Grove Mobile Trailer Park	110	Wells
66	Chateau Hyde Park Home for Adults	120	Wells
67	Chelsea Ridge Apartments	1800	Wells
68	Clove Branch Apartments	19	Wells
69	Colonial Maples Trailer Park	30	Wells
70	Cooper Road Trailer Park	35	Wells
71	Cove View Apartments	48	Wells
72	Daytop Village	70	Wells
73	Dutch Garden Apartments	450	Wells
74	Duchess Trailer Park	30	Wells
75	East Mountain Trailer Park	28	Wells
76	Eleanor Roosevelt	200	Wells
77	Elliott Apartments	36	Wells
78	Ennis Mobile Home Park	92	Wells
79	Fetler Trailer Court	60	Wells
80	Fieldside Apartments	90	Wells
81	Fishkill Park Apartments	200	Wells
82	Frantoni Villas	50	Wells
83	Gerhard P Sturges	30	Wells
84	Green Haven Correctional Facility	NA	Reservoir
85	Green Meadow Trailer Court	96	Wells
86	Greer School	300	Wells
87	Harlem Valley Psychiatric Center	1200	Swamp River
88	Haviland Apartments	100	Wells
89	Haviland Mobile Home Park #1	44	Wells
90	Haviland Mobile Home Park #2	29	Wells

Non-Municipal Community

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
91	Hi Vu	50	Wells
92	Hickory Hill Mobile Home Park	250	Wells
93	Hidden Hollow Apartments	850	Wells
94	Hidden Valley Mobile Court	30	Wells
95	High Meadows Park Inc	196	Wells
96	Hoffman Trailer Park	26	Wells
97	Hudson River Psychiatric Center	2000	Hudson River
98	Hudson View Water Works	1800	Wells
99	Hyde Park Mobile Manor Estates	NA	Wells
100	Hyde Park Terrace Apartments	70	Wells
101	Kent Hollow Apartments	20	Wells
102	Kommel Trailer Park	20	Wells
103	Lake Ellis Mobile Home Park	81	Wells
104	Lake Lodges Apartments	24	Wells
105	Lake Walton Park	62	Wells
106	Lakeview Mobile Home Park	NA	Wells
107	Lamplight Court Mobile Estates	23	Wells
108	Ledges Apartments	460	Wells
109	Little Falls Trailer Park	161	Wells
110	M and D Mobile Home Park	108	Wells
111	Maple Lane Trailer Park	150	Wells
112	May Land Mobile Park	30	Wells
113	Maynards Mobile Manor	101	Wells
114	McCartha's Trailer Park	42	Wells
115	Mobile Home Gardens	30	Wells
116	Montclair Townhouse Apartments	660	Wells
117	Mountain View Mobile Estates	55	Wells
118	Northeastern Conference Nursing Home	120	Wells
119	Northern Dutchess Mobile Home Park	31	Wells
120	Odells Trailer Park	19	Wells
121	Osborne Trailer Park	15	Wells
122	Palmer Apartments	27	Wells
123	Parkway Apartments	16	Wells
124	Partridge Hill Apartments	150	Wells
125	Phillips Trailer Park	65	Wells
126	Pine Grove Mobile Home Park	39	Wells
127	Powell Road Mobile Park	115	Wells
128	Ramsey's Trailer Park	28	Wells
129	Red Church Trailer Park	12	Wells
130	Rhinebeck Country Village	100	Wells
131	Rhinebeck Mobile Court	120	Wells
132	Roberts Running Creek Trailer Park	88	Wells
133	Route 82 Trailer Park	26	Wells
134	Royal Crest Apartments	150	Wells
135	Sabo Trailer Park	45	Wells
136	Saith Mobile Home Park	26	Wells
137	Scenic Apartments	432	Wells
138	Scenic View Mobile Home Park	27	Wells
139	Shady Acres Trailer Park	26	Wells
140	Shady Homes Trailer Park	42	Wells
141	Shady Lane Trailer Park	13	Wells
142	Simpson Mobile Home Site	27	Wells
143	Springhill Mobile Home Park	NA	Wells
144	Sunset Farms Mobile Home Park	35	Wells
145	Sunset Knolls	50	Wells
146	Taconic Motor Lodge	22	Wells
147	Tally Ho Mobile Estates	NA	Wells
148	Tai Apartments	76	Wells
149	The Lodge At Rhinebeck	NA	Wells
150	Unification Theological Church	150	Wells
151	Val Kill Park East	72	Wells
152	Valley Forge Mobile Home Park	60	Wells
153	Venture Lake Estates	44	Wells
154	Village Crest Apartments	600	Wells
155	Woodlands Falls Trailer Park	50	Wells
156	Wassaic Developmental Center	2300	Wells
157	Willow Tree Park	30	Wells
158	Wingdale Village Park	72	Wells
159	Woodcrest Manor Adult Home	NA	Wells
160	Woodfield Apartments	7	Wells

PUTNAM COUNTY

Municipal Community

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
1	Alpine Village	300	Wells
2	Archer Estates	100	Wells
3	Beacon City (See Dutchess Co)		Cargill Reservoir
4	Blackberry Hill	900	Wells
5	Bonnyville Water Company	300	Wells
6	Brewster Heights	1100	Middle Branch Reservoir
7	Brewster Village	5200	East Branch Croton River
8	Capre Estates	100	Wells
9	Carmel Water District #2	9000	Lake Glenida
10	Carmel Water District #1	1600	Lake Secor
11	Carmel Water District #6- Baldwin Water Company	1600	Wells
12	Carmel Water District #5- Maple Terrace	180	Wells
13	Carmel Water District #6- Shell Valley	126	Wells
14	Carmel Water District #7- Tomahawk Creek	68	Wells
15	Chateau Ridge	100	Wells
16	Cold Springs Village	3000	Foundry Brook Reservoir
17	Colonial Drive	105	Lake Mahopac
18	Country Hill Estates	280	Wells
19	Crescent Road Water Supply	20	Wells
20	First Brewster Corporation	255	Wells
21	Floradan Lodge	100	Wells
22	Forest Park Homes	200	Wells
23	Fox Hill Estates	128	Wells
24	Garrison Water Supply	88	Wells (Infiltration Gallery)
25	George Walsh	48	Wells
26	Glenmar Gardens	NA	Wells
27	Greymoor Village	220	Wells
28	Gypsy Trail Club	300	Wells
29	Hillsdale Estates	240	Wells
30	Indian Hills	56	Wells
31	Ivy Hill Water Supply	240	Wells
32	Kent Water District #1	360	Wells
33	Lake View Park	400	Lake Mahopac
34	Leeside Estates	256	Wells
35	London Bridge Water Works	288	Wells, Well (Infiltration Gallery)
36	Mahopac Hills	440	Lake Mahopac
37	Mahopac Lake Shore Estates	80	Wells
38	Mahopac Ridge Water Supply	1600	Lake Mahopac
39	Mahopac Water Company	500	Wells
40	Mill Pond Water Supply	70	Wells
41	New York City - Aqueduct System (page 76)		Dog Brook, East Branch and Middle Branch Reservoirs (Croton Aqueduct System); Boyd Corners[1] (drained, unsafe dam), Croton Falls[2], and West Branch Reservoirs[1] (Croton and Delaware Aqueduct Systems)
42	Rainbow Hill Estates	120	Wells
43	Red Mills Water Supply	600	Wells
44	Spring Knoll Estates	50	Wells
45	Star Ridge Manor	368	Wells
46	Sunrise Ridge	178	Wells
47	Union Valley Estates	200	Wells
48	Vails Grove	520	Wells
49	West Branch Acres	240	Wells
50	Wildwood Homes	148	Wells
51	Wood Hill Estates	100	Wells
52	York View	200	Wells

Non-Municipal Community

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
53	Brewster Woods Condominium	200	Wells
54	Capuchin Theological Seminary	65	Reservoir, Wells
55	Carpenter Trailer Park	NA	Wells
56	Casa Serena Rest Home	30	Wells
57	Clearing in the Woods	162	Wells
58	Cold Spring Trailer Court	15	Wells
59	Elm Apartments	48	Wells
60	Forest Haven Apartments	600	Wells
61	Harmony Trailer Park	NA	Wells
62	Holly Stream Condominium Apartments	225	Wells
63	Kent Apartments	56	Wells
64	Kent Nursing Home	155	Wells
65	Knolls Trailer Court	NA	Wells
66	Ludingtonville Apartments	80	Wells
67	Malcolm Gordon School	61	Wells
68	Meadow Motor & Mobile Home Court	30	Wells
69	Middle Branch Apartments	61	Wells
70	Patterson Trailer Park	80	Wells
71	Patterson Village Condominiums	192	Wells
72	Post Road Mobile Home Park	NA	Wells
73	Putnam Community Hospital	111	Wells
74	St Basil Academy	40	Indian Brook
75	Tilly Foster Apartments	16	Wells
76	Vista on the Lake Condominiums	602	Wells
77	Wattles Nursing Home	75	Wells
78	Wendolin Town House Apartments	150	Wells
79	Woodcrest Apartments	600	Wells

[1] Functions as part of Delaware System, overflow goes into Croton System.

[2] Functions as part of the Croton System, but has limited capability to pump into the Delaware System.

REFERENCE NO. 8

STATE OF NEW YORK

DEPARTMENT OF CONSERVATION

WATER RESOURCES COMMISSION

Ground-Water Resourses of Dutchess County, New York

By

E. T. SIMMONS, I. G. GROSSMAN, AND R. C. HEATH

Geologists, U. S. Geological Survey

Prepared by the

U. S. GEOLOGICAL SURVEY

in cooperation with the

NEW YORK WATER RESOURCES COMMISSION

BULLETIN GW-43

ALBANY, N. Y.

1961

yields have been reported is 3 gpm (gallons per minute) with a range from 1 to 4 gpm. The yields of most wells that draw from till are not known, because pumps are operated for only short periods and draw largely from water stored in the well. In general, wells tapping till may be expected to yield only a few hundred gallons a day.

The permeability of till is very low, and hence the movement of ground water into and through the deposit is extremely slow. As a result, most of the precipitation on areas underlain by till either runs off on the surface or is intercepted by plants to satisfy transpiration needs before it can reach the water table. Most wells drawing water from till are dug only a few feet below the water table. Thus, during dry periods many of these wells either "go dry" or fail to yield the required quantity of water. Most wells in Dutchess County reported to have been inadequate one or more times since construction, or to have failed completely, are dug wells tapping glacial till. Many of these wells are on hills, and the failures are largely due to seasonal decline of the water table.

Deposits in Valleys

The thickest unconsolidated deposits in Dutchess County occur in valleys and other lowland areas. These deposits consits of (1) till, (2) fine-grained stratified deposits of silt and clay, and (3) coarse-grained stratified deposits of sand and gravel. Plate 3 is a map of the county showing the principal unconsolidated deposit in each area. Areas shown as underlain by till generally do not contain any other unconsolidate deposit. Till in many of the valley areas underlies low irregularly shape hills that are surrounded by stratified deposits. In other areas, as at Pawling in the southeast corner of the county, the till extends from the uplands across the lowlands as a relatively continuous sheet. Till in the lowlands is generally thicker than in the uplands. Its average thickness is probably between 25 and 50 feet, though the actual thickness in some areas exceeds 100 feet. The water-bearing characteristics of the till are similar to those of the till in the uplands.

The fine-grained stratified deposits are widely distributed throughou most valley areas. Those areas in which the unconsolidated deposits consi entirely or almost entirely of clay and silt are shown on plate 3. However fine-grained stratified deposits are present also in many of the areas sho on the map to be underlain by sand and gravel. In these areas the clay an silt may either overlie, be interbedded with, or underlie the sand and gra Plate 3 shows that most of the areas in which clay and silt is the princip unconsolidated deposit are in the western part of the county, either adjacent to or near the Hudson River. These deposits are generally less than 50 feet thick, although they are as much as 125 feet thick in the are bordering the Hudson River south of Rhinebeck.

In view of the extremely low permeability of the clay and silt, the deposit will not yield water in usable quantities to wells and springs. In those areas in which clay and silt is the only or the principal unconsolidated deposit, ground-water supplies can be obtained only from the underlying bedrock. Although clay and silt is not important as a source of water, it exerts considerable influence on the occurrence of water. On the terraces adjacent to the Hudson River in the northwestern part of the county the clay and silt retards or prevents recharge to the underlying bedrock. Conversely, in the lower parts of many of the valleys the clay and silt retards upward leakage of water from the underlying beds of sand and gravel and bedrock. In these areas the water in the sand and gravel and in the bedrock occurs under artesian conditions, and in a few places is under sufficient pressure to flow at the land surface.

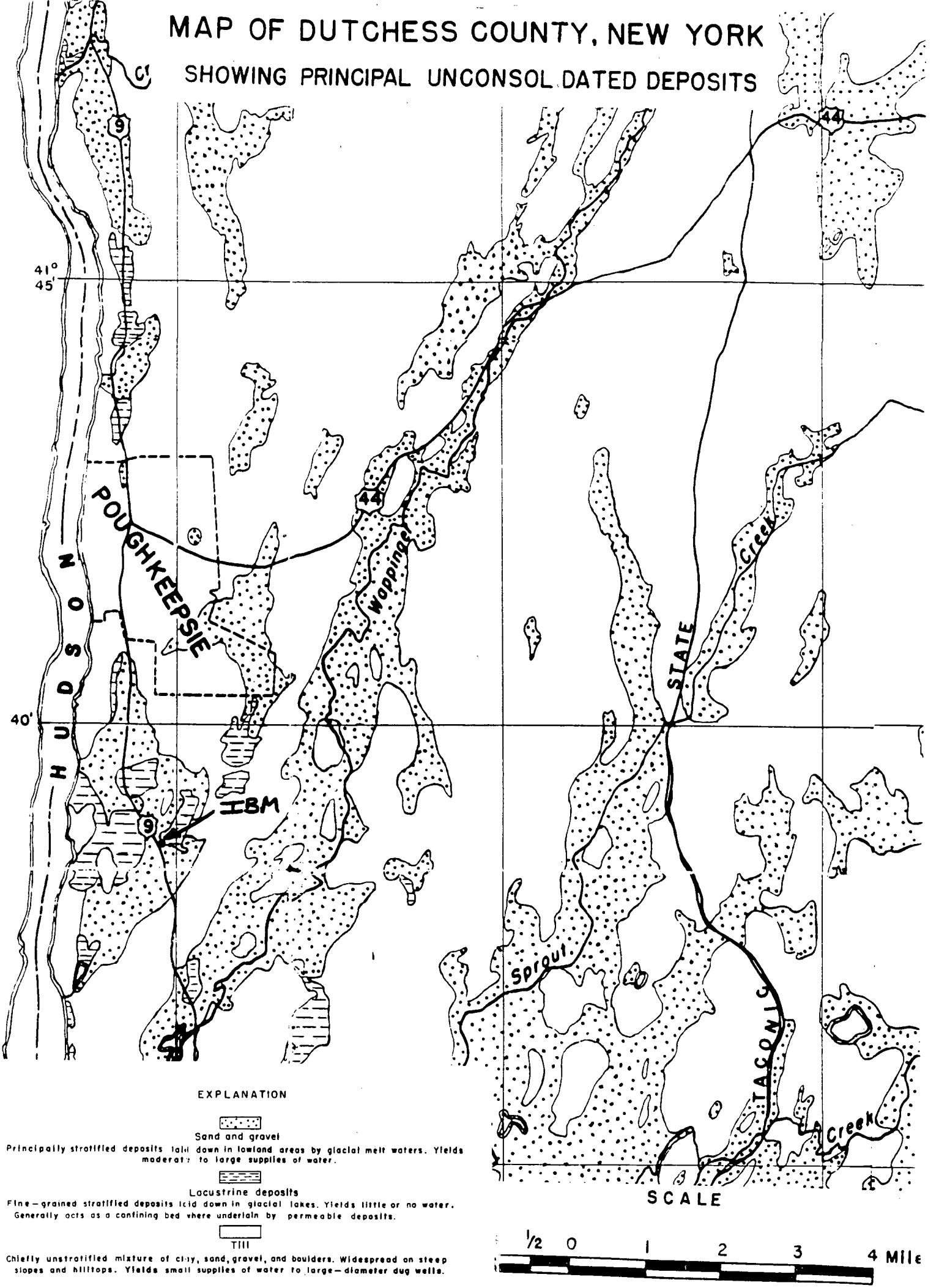
The sand and gravel is the most productive water-bearing deposit in the county. Plate 3 shows that this material underlies most of the lower part of the main valleys and many of the larger tributary valleys. The sand and gravel appears to have been laid down by swift-flowing streams of glacial melt water which were heavily laden with rock debris derived from the melting ice. As both the character and the amount of rock debris carried by the streams varied considerably from time to time, the thickness, character, and extent of the sand and gravel deposits vary considerably within relatively short distances. The beds of sand and gravel are associated with beds of silt and clay almost everywhere. In some areas wells penetrate as many as two or three distinct layers of sand and gravel, which are interbedded with layers of silt and clay. The layers of sand and gravel are generally less than 25 feet thick, although in some areas they are as much as 50 feet thick.

Deposits of sand and gravel are utilized extensively as a source of water supply. In these deposits small-diameter driven wells with screened drive points will generally yield water in sufficient quantity for domestic, farm, and small commercial needs. The moderate to large quantities of water needed by municipalities and industries can generally be obtained from large-diameter drilled wells. According to the quantity of water required and the character of the deposit, such wells may be either screened or finished with open-end casings. A comparison of the yield of screened and unscreened wells is shown in table 5. The yield of unscreened wells for which records were collected ranged from 3 to 200 gpm and averaged 38 gpm. The yield of screened wells ranged from 20 to 800 gpm and averaged 318 gpm.

The thickest section of unconsolidated deposits in the county underlies the present channel of the Hudson River. These deposits range in character from clay and silt to gravel and boulders. Berkey and Rice (1921, pl. 47a) indicate that more than 100 feet of sand underlies the river in the southeastern part of the county, about 0.1 mile north of the Putnam County line. The sand underlies about 100 feet of silt and clay and is underlain in turn by clay and by gravel, cobbles, and boulders. The sand is not continuous across the river but lenses out laterally. It also

MAP OF DUTCHESS COUNTY, NEW YORK

SHOWING PRINCIPAL UNCONSOLIDATED DEPOSITS



MAP OF DUTCHESS COUNTY, NEW YORK

SHOWING LOCATION OF SELECTED WELLS AND SPRINGS

EXPLANATION

SPRINGS	WELLS	WATER-BEARING MATERIAL
♀	○	Bedrock
♀	●	Unconsolidated deposits
♀	◑	Bedrock and unconsolidated deposits
♀	⊙	Unknown

Symbol indicates type of water-bearing material. Upper figure is well or spring number with prefix "Du" omitted; suffix "Sp" also omitted in spring numbers. Lower figure is thickness, in feet, of unconsolidated deposits. Plus sign (+) following lower figure indicates that thickness of unconsolidated deposits is unknown but is greater than figure given.

SCALE

0 1 2 Miles

CONTOUR INTERVAL 20 FEET

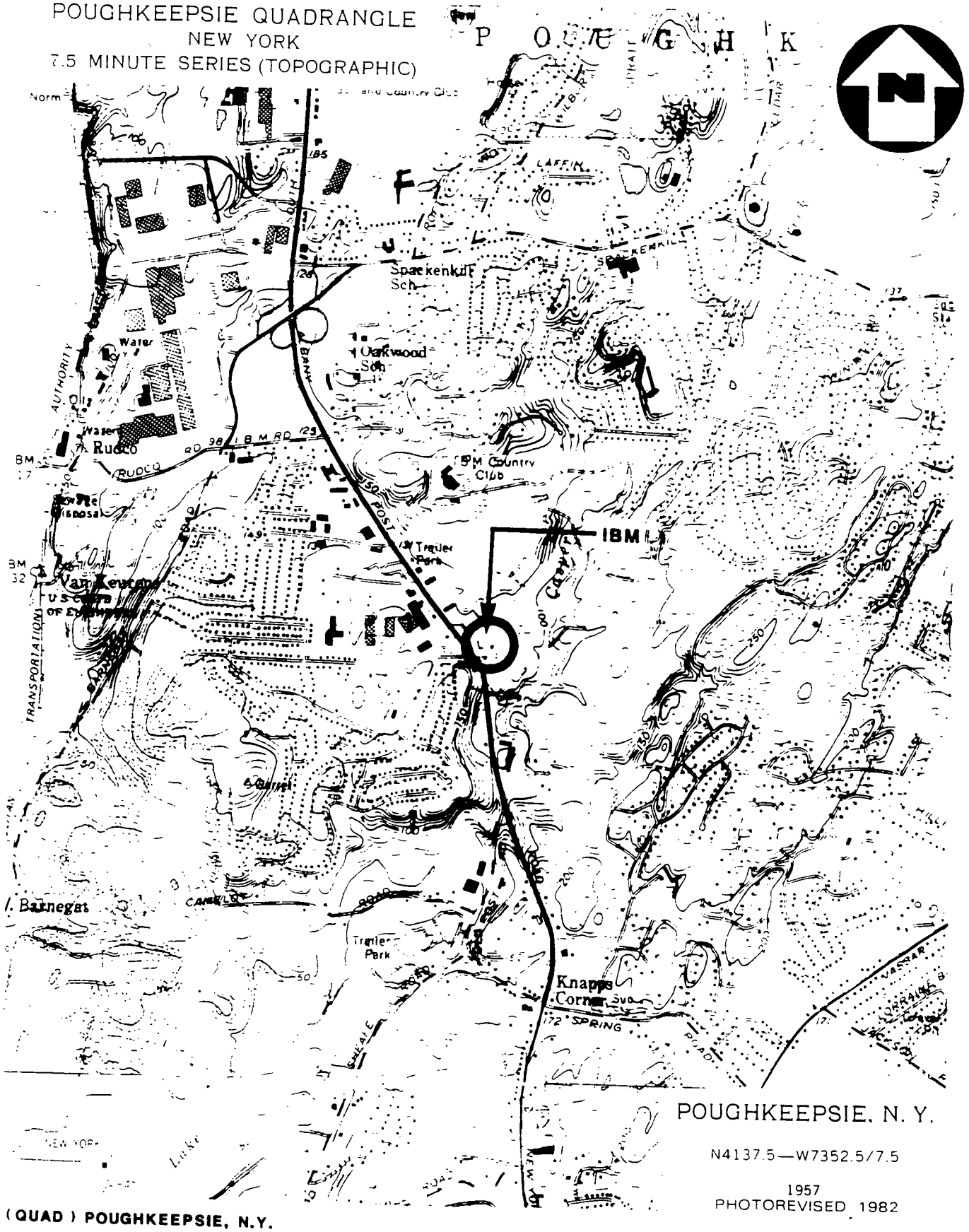
DATUM IS MEAN SEA LEVEL

Table 13.--Records of selected wells in Dutchess County (Continued)

Well number	Location	Owner or occupant	Altitude above sea level (feet)	Type of well	Depth below land surface (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing formation	Water level below land surface (feet)	Method of lift	Yield (gallons per minute)	Use	Remarks
Du 56	13Y, 2.0N, 1.4W	J. Cunningham	600	Drl	75	6	2	Hudson River formation	10	Suction	4	Dom	Yield 2 gpm when well was 40 ft deep.
Du 57	13Y, 1.3N, 1.1W	George Degenhardt	660	Drl	104	6	20	do.	18	--	8	Dom	Yield 2 gpm when well was 20 ft deep. (a).
Du 58	13Y, 1.3N, 0.2W	B. Rollins	380	Drl	150	6	25	do.	20	Suction	3	Farm	
Du 59	13Y, 0.1S, 7.8W	Mrs. Cahallen	240	Drl	80	6	--	do.	30	--	3	Dom	
Du 60	13Y, 0.7S, 6.8W	Dairymen's League Co-op. Assn. Inc.	220	Drl	280	8	--	do.	40	Turbine	60	Com	Average consumption is 12,000 gpd.
Du 61	15Y, 14.2N, 1.9W	Clifford Porter	420	Dug	8	96	7	Pleistocene till	2	Suction	--	Farm	Temperature 55°F, May 1949.
Du 62	15Y, 6.2N, 0.1W	A. McGregor	300	Drl	100	6	14	Stockbridge limestone	22	Force	--	Farm	
Du 63	14Y, 10.7S, 8.8E	Williston Manufacturing Corp.	470	Drl	200	6	14	do.	--	do.	--	Ind	Standby well; spring Du 38Sp is principal source of supply. (a).
Du 64	14Y, 12.4N, 7.1W	Rhinebeck Water Co.	260	Drl	300	8	--	Hudson River formation	19	Turbine	135	PS	(a) (b).
Du 65	14Y, 12.4N, 7.1W	do.	260	Drl	300	8	--	do.	--	do.	65	PS	
Du 66	14Y, 13.7N, 8.5W	William Hetherington	160	Drl	192	8	15	do.	+5	--	70	Dom	Yield 6.5 gpm when well was 170 ft deep.
Du 67	14Y, 14.2N, 8.0W	L. B. Barber	160	Drl	60	6	10	do.	30	Force	3	Dom	
Du 68	15Y, 10.1N, 9.1W	A. W. Springer	140	Drl	120	6	42	Stockbridge limestone	--	--	--	Dom	
Du 69	15Y, 15.9N, 8.4W	Fairview Improvement Co.	380	Drl	250	6	20	Hudson River formation	24	--	12	Dom	(b).
Du 70	15Y, 14.0N, 6.4W	Aartsen Van Wagenen	200	Drl	113	6	38	do.	--	--	8	Dom	Yield 0.5 gpm when well was 60 ft deep.
Du 71	14Y, 7.2N, 8.2W	Staatsburg Water Co.	240	Drl	305	10 to 8	22	do.	14	Turbine	120	PS	(a).
Du 73	14Y, 6.8S, 10.1E	School District No. 8	500	Drl	97	6	45	Stockbridge limestone	12	--	6	Dom	
Du 74	14Y, 13.2N, 6.9W	Crow Hill Farm Camp	280	Drl	125	6	12	Hudson River formation	12	--	15	Com	Drawdown 28 ft after pumping 15 gpm for 5 hrs.
Du 75	14Y, 15.2N, 7.0W	Sunset Rest	200	Drl	147	6	24	do.	10	--	10	Com	Drawdown 32 ft after pumping 10 gpm for 5 hrs.
Du 76	13Y, 0.4S, 4.7E	Shekomeko Valley Farm	400	Drl	435	10 to 8	68	do.	22	--	9	Farm	Well has been pumped at 9 gpm for 8 hrs.
Du 77	15Y, 12.5N, 6.9W	Henry Siegel	200	Drl	120	6	57	Stockbridge limestone	--	--	15	Dom	(b).
Du 78	15Y, 10.6N, 9.6W	International Business Machines Corp.	100	Drl	400	6	(34)	do.	--	--	40	Ind	Well has been pumped at 40 gpm for 9.5 hrs. (b).
Du 79	13Y, 7.5S, 4.5E	John Fastert	700	Drl	145	6	53	Hudson River formation	20	--	15	Dom	Drawdown 105 ft after pumping 15 gpm for 2 hrs.
Du 80	13Y, 6.2S, 1.0E	Camp Laurel	600	Drl	200	4½	44	do.	--	--	12	Com	
Du 81	13Y, 3.7S, 9.2E	Silver Acre Farm	1,180	Drl	164	6	13	do.	25	--	6	Farm	Drawdown about 140 ft after pumping 6 gpm for 1 hr.
Du 82	14Y, 15.8S, 5.1E	Interchurch Camp Society, Inc.	740	Drl	52	8 to 6	22	Granite and gneiss, undiff.	18	--	8	Dom	Drawdown 30 ft after pumping 8 gpm for 6 hrs.
Du 83	14Y, 16.0N, 2.4W	Ephraim Feinstein	520	Drl	115	6	3	Hudson River formation	15	--	18	Dom	Drawdown 65 ft after pumping 18 gpm for 7 hrs. (b).
Du 84	15Y, 7.5N, 8.9W	Village of Wappingers Falls	150	Drl	80	16 to 8	--	Pleistocene sand and gravel	--	Centrifugal	160	PS	Average pumpage from wells Du 84 and Du 85 is about 120,000 gpd. (a).
Du 85	15Y, 7.5N, 8.9W	do.	150	Drl	80	16 to 8	--	do.	--	do.	150	PS	Temperature 51°F, October 1949.
Du 86	14Y, 6.7S, 3.5E	R. McKinney	480	Dug	16	30	--	do.	11	None	--	None	Temperature 53°F, June 1949.
Du 87	13Y, 4.4N, 7.9W	Village of Tivoli	140	Drl	36	6	36	do.	13	--	20	PS	Drawdown 17 ft after pumping 20 gpm for 10 hrs. Well originally drilled 4 ft into bedrock; screened between depths of 30 and 36 ft. Two other similar wells at this location. (a) (b).
Du 90	13Y, 15.2S, 10.3E	Wassaic State School	460	Drl	1007	8	--	do.	5	--	--	None	Well finished with screen. Abandoned because of a decrease in yield. (a) (b).
Du 91	14Y, 8.4S, 10.9E	Pawling Girl Scout Camp	620	Drl	255	6	17	Hudson River formation	6	--	5	Dom	Drawdown 119 ft after pumping 5 gpm for 2 hrs.
Du 92	14Y, 6.8N, 0.9W	New York State Dept. of Public Works	482	Drl	199	6	43	Stockbridge limestone	--	Jet	15	Dom	

REFERENCE NO. 9

POUGHKEEPSIE QUADRANGLE
NEW YORK
7.5 MINUTE SERIES (TOPOGRAPHIC)



POUGHKEEPSIE, N. Y.

N4137.5—W7352.5/7.5

1957
PHOTOREVISED 1982

(QUAD) POUGHKEEPSIE, N.Y.

SCALE 1:24000

1 MILE

REFERENCE NO. 10

NUS CORPORATION

TELECON NOTE

CONTROL NO: 02-8810-71

DATE: 1/17/89

TIME: 15:13

DISTRIBUTION:

IBM file - COR

BETWEEN: Ms. Cibelli; of Town Clerk's Office

OF: Poughkeepsie

PHONE: (914) 485-3620

AND:

Tom Varner

DISCUSSION:

NUS

I called the clerk's office to obtain the name of a contact from whom I might obtain information concerning use of the Casper Creek. Ms Cibelli said there are no irrigation, commercial, or recreational uses of the Casper Creek (& described the ~~Sing~~ TAV 1/17/89 particular length of creek I was interested in).

TAV 1/17/89

ACTION ITEMS:

NUS 067 REVISED 0581

REFERENCE NO. 11

SIGNIFICANT HABITAT OVERLAY NO. 1 OF 2

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF FISH AND WILDLIFE
BUREAU OF WILDLIFE

PREPARED FOR: SIGNIFICANT HABITAT UNIT
WILDLIFE RESOURCES CENTER
DELMAR, NEW YORK 12054
(518) 457-5782

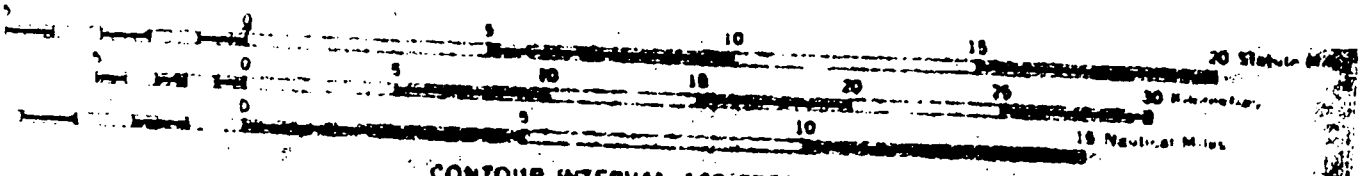
PREPARED BY: HABITAT INVENTORY UNIT

QUAD: HARTFORD

SCALE: 1:250,000

MARCH [illegible], 1981

REVISED: 4/20/81 mp



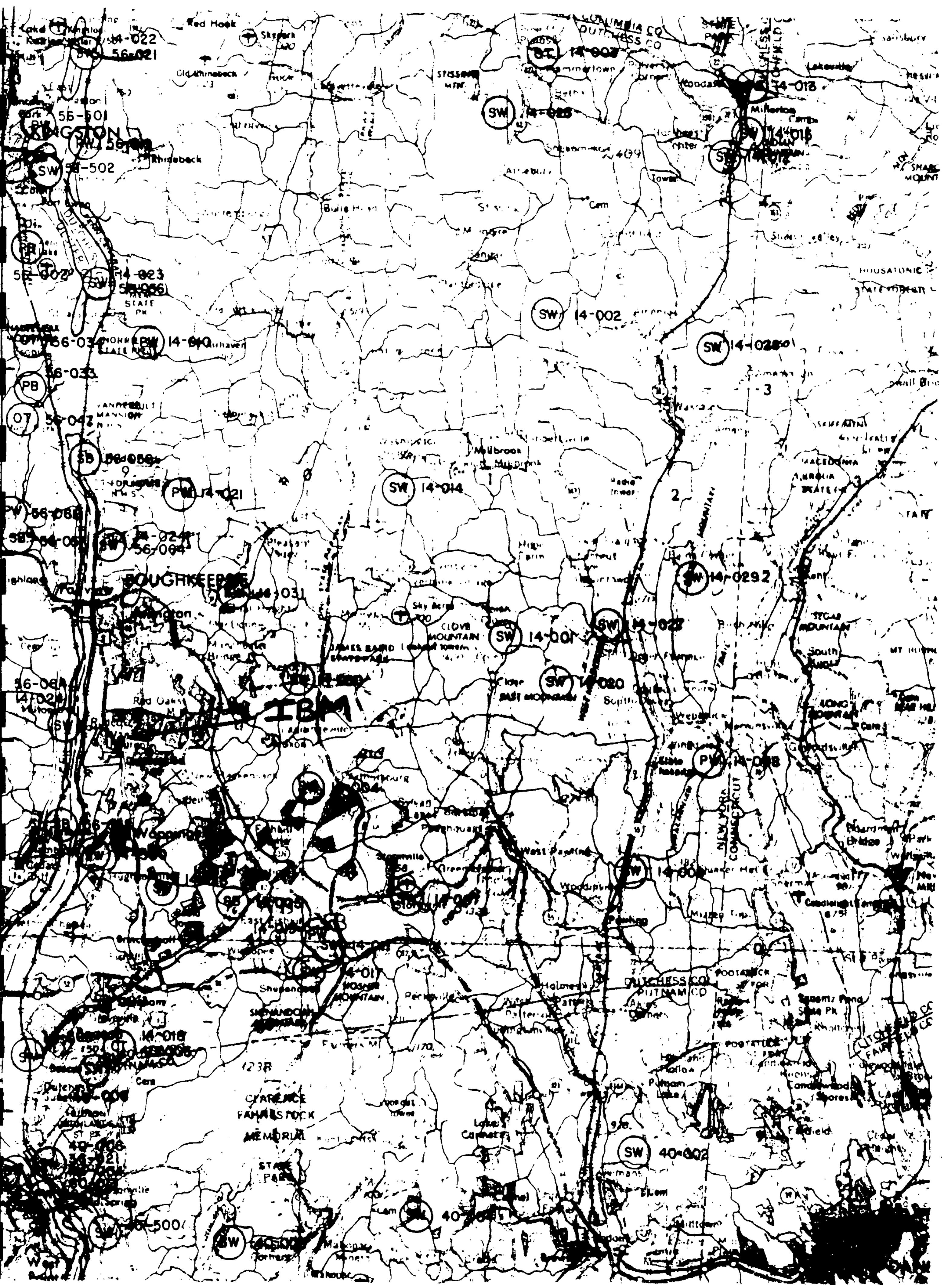
CONTOUR INTERVAL 100 FEET
WITH SUPPLEMENTARY CONTOURS AT 50 FOOT INTERVALS

TRANSVERSE MERCATOR PROJECTION

KEY

- (SW) SIGNIFICANT FOR WILDLIFE
- (SP) SIGNIFICANT FOR PLANTS
- (SB) SIGNIFICANT FOR WILDLIFE AND PLANTS
- (PW) POTENTIALLY SIGNIFICANT FOR WILDLIFE
- (PP) POTENTIALLY SIGNIFICANT FOR PLANTS
- (PB) POTENTIALLY SIGNIFICANT FOR WILDLIFE AND PLANTS
- (OT) OTHER (e.g. UNIQUE GEOLOGICAL FORMATIONS)

BOSTON
RICHMOND
EVANSTON
Newman
Bar Harbor


Red Hook
KINGSTON
SW 56-502
56-501
Rhinebeck
DUTCHESS CO
Millerton
SW 14-002
SW 14-028
PB 56-033
OT 56-047
SW 14-014
PW 14-021
Millbrook
SW 14-029
CLOVE MOUNTAIN
SW 14-001
SW 14-020
IBM
Sky Acres
West Pawling
DUTCHESS CO
PUTNAM CO
CLARENCE
MEMORIAL
STATE PARK
SW 40-002
HOUSATONIC
MACEDONIA
NEW YORK
CONNECTICUT

SIGNIFICANT HABITAT OVERLAY NO. 2 OF 2

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF FISH AND WILDLIFE
BUREAU OF WILDLIFE

PREPARED FOR: SIGNIFICANT HABITAT UNIT
WILDLIFE RESOURCES CENTER
DELMAR, NEW YORK 12054
(518) 457-5782

PREPARED BY: HABITAT INVENTORY UNIT

QUAD: HARTFORD

SCALE: 1:250,000

MARCH, 1981

REVISED: MP 4/20/81

KEY

Scale 1:250,000

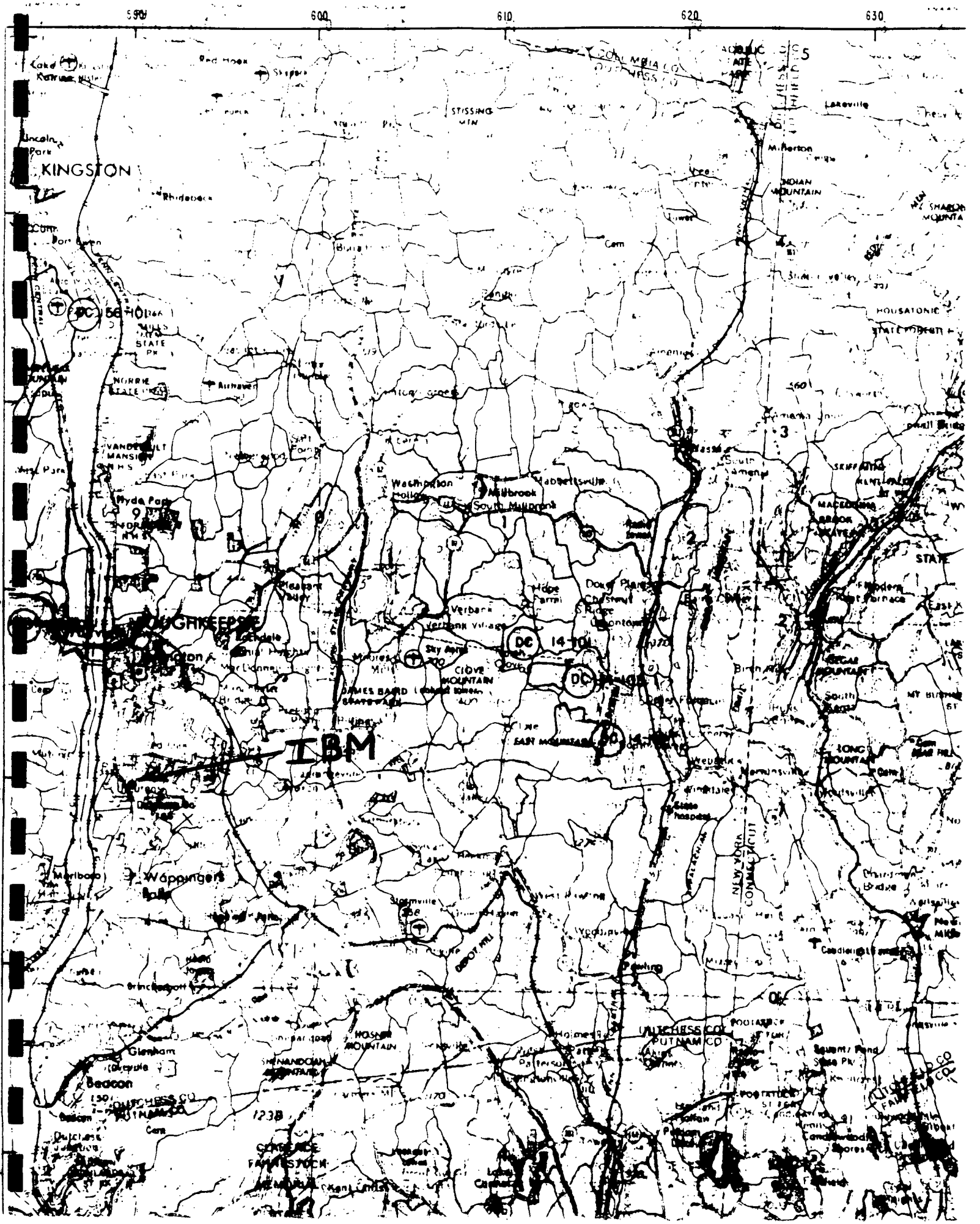
DC — DEER CONCENTRATION AREA IN USE

DN — ~~DEER CONCENTRATION AREA NOT IN USE~~

DA — DEER CONCENTRATION AREA - AERIAL SURVEY

EXCLUDED AREA

RN UNITED STATES 1:250,000



REFERENCE NO. 12

DRAFT

GRAPHICAL EXPOSURE MODELING SYSTEM

(GEMS)

USER'S GUIDE

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDES AND TOXIC SUBSTANCES
EXPOSURE EVALUATION DIVISION
Task No. 4
Contract No. 68016618
William Wood - Project Officer
Loren Hall - Task Manager

Prepared by:

GENERAL SOFTWARE CORPORATION
8401 Corporate Drive
Landover, Maryland 20785

Submitted: June 25, 1984

MASTER AREA REFERENCE FILE (MARF) OF THE 1980 CENSUS

Source

The Master Area Reference File (MARF) is a proprietary product of Donnelly Marketing, Inc., a subsidiary of Dunn and Bradstreet, and is available only to EPA users and to contractors engaged in EPA projects.

Description

The complete corrected MARF of the 1980 Census, with geographic coordinates for small geographic areas, is installed for GEMS on a separate disk pack. It consists of four subfiles, one for each major census geographic region, and is available to users when that disk pack is mounted. The file has a variety of location identification information, including region, state, county, place, census tracts and enumeration districts or block groups (See Figure C-1 for illustrations). It also contains population count by race, the number of occupied and owner-occupied housing units, group quarters, and number of families for all the enumeration districts/block groups for the continental United States, Hawaii, and Alaska.

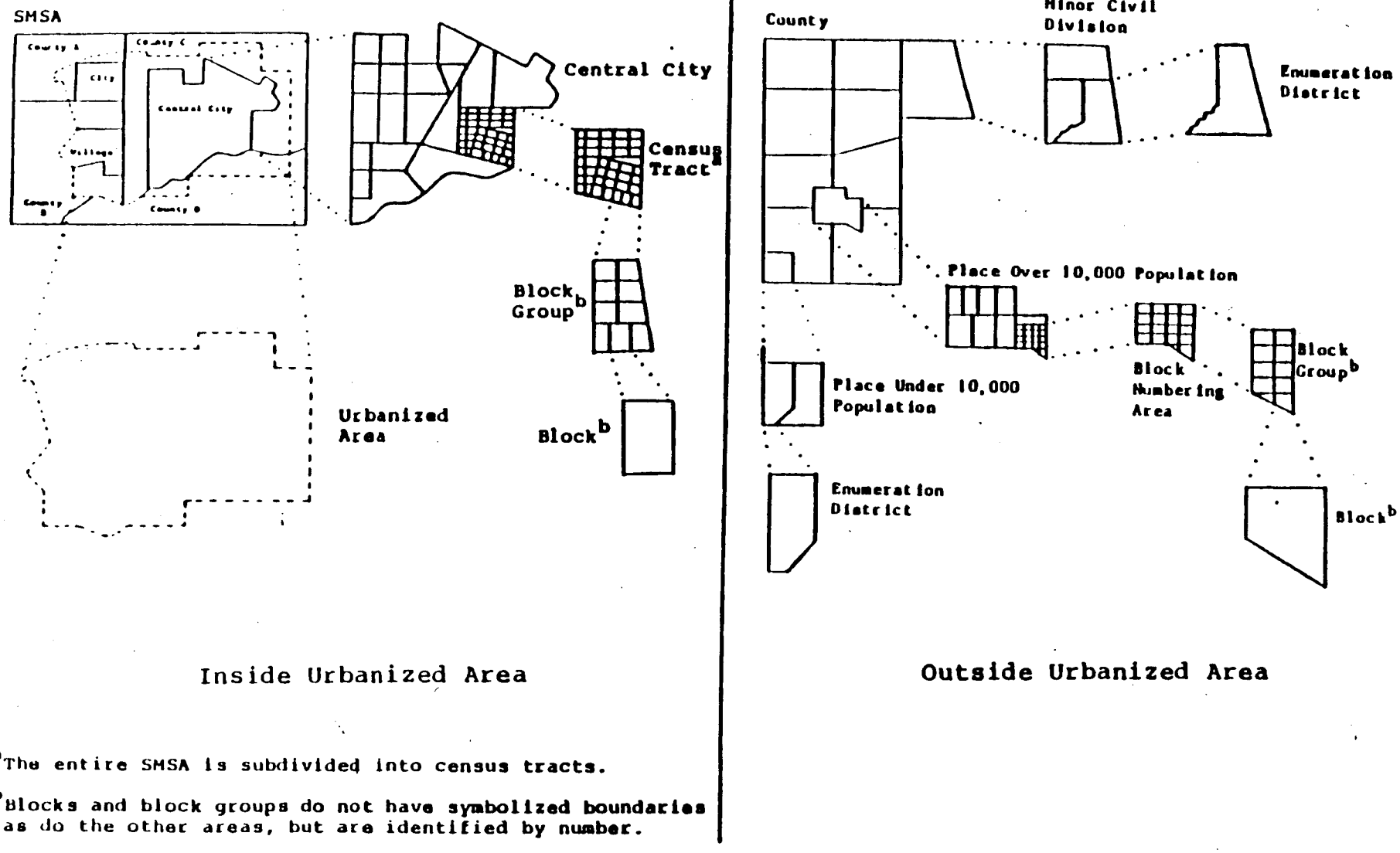
CEDPOP, a subset of the MARF of the 1980 Census, is accessible through GEMS. In addition to total population and household counts, the file includes geographic coordinates for the population-weighted centroid of each census block group or enumeration district (BG/ED) in the file.

Use

The complete MARF 80 Census file, installed in GEMS on a separate disk, is expected to be used heavily by GEMS users to identify household and population by racial groups at any required geographic level. County aggregate populations have already been created from this file.

CEDPOP was interfaced with ATM80 in GEMS to provide estimates of population sizes exposed to concentrations of airborne chemicals around a release site and with BOXMOD80 to provide population estimates within area source regions. The population centroids are identified, and populations are accumulated in sectors (typically the sixteen wind direction sectors) surrounding the center point within a user-specified number of radial distances out from the center.

The CEDPOP file also is accessed by CENSUS DATA and RADII-5 procedures under the GEODATA HANDLING operation in GEMS. CENSUS DATA accumulates population and housing counts by up to ten user-specified radial distances and from one-to-sixteen sectors. The RADII-5 program tabulates the same information (except housing counts) and displays the centroid locations for user-specified circular distances around a center point.



[a]The entire SMSA is subdivided into census tracts.

[b]Blocks and block groups do not have symbolized boundaries as do the other areas, but are identified by number.

Figure C-1. Geographic Hierarchy Inside and Outside Urbanized Areas (UA's)

IBM

Lat: 41°38'36"N Long: 73°55'12"W

List of Dataset: NYGF Number of Records = 6 Group = 1

REC #	POP	HOUSE	DISTANCE (km)	SECTOR	POP. (TOTAL)	DISTANCE (mi)
1	0	0	0.400000	1	137*	0.25
2	2591	752	0.810000	1	2728	0.50
3	5335	1585	1.60000	1	8063	1.0
4	8668	2901	3.20000	1	16,731	2.0
5	11102	3841	4.80000	1	27,833	3.0
6	32884	11878	6.40000	1	60,717	4.0

* Taken from USGS Topographical Map, "Poughkeepsie Quadrangle, NY", 1957, photorevised 1982.

0.25 mi { Number of houses: 36
Population: 36 × 3.8 ≈ 137

REFERENCE NO. 13

NUS CORPORATION

TELECON NOTE

CONTROL NO: 02-8810-71 | DATE: Jan. 18, 1989 | TIME: 15:25

DISTRIBUTION:

IBM - COR

BETWEEN: Ms. Terry Harrison | OF: Regulatory Affairs, Reg. 3, NYSDEC, Regional Headquarters | PHONE: (914) 255-5453

AND: Thomas Varner

NUS

DISCUSSION:

I call Ms. Harrison earlier TV 1/18/89 to obtain the state water quality classification for the Casper Creek. She returned my call and I told her why I had called. She told me that from the mouth of the creek to the Cobalt Lake it was classified C, and from above the lake it was D. She told me the lake was classified B. B signifies protected waters, while C and D don't, she told me. She said she didn't know where Cobalt Lake was, but that the creek became a D classification just above the IBM Country Club location. I then asked her if I could send her a list of other bodies of water for which we need the same codes and if she would be able to send them to us. She said yes, if it was too big of a list, and that it would take a little time. I told her I would get back to her.

TAV 1/18/89

ACTION ITEMS:

REFERENCE NO. 14

VUS CORPORATION

TELECON NOTE

CONTROL NO: 02-8810-71

DATE: Jan. 25, 1989

TIME: 10:28

DISTRIBUTION:

IBM - Cor.

BETWEEN: Mr. Leo Lowney

~~of~~ Wappinger's Falls Village Clerk

PHONE: (914) 297-8773

AND: Thomas Varner

VUSI

DISCUSSION:

I called the clerk's office to obtain some information about their drinking water. I asked Mr. Lowney of the Village used water from any other source other than their municipal wells. He said not at this time, but that they were negotiating with the Town of Poughkeepsie to use their water as backup. He said they have 5 municipal wells which the Village uses now. I asked him if all 5 are used actively or if some were back-up. He said he didn't know, but that I could call the Water Clerk, Ms. Bridgette Gannon, at (914) 297-3716 or John Bailey at the pump station at (914) 297-3787. TAV 1/25/89

ACTION ITEMS:

REFERENCE NO. 15

YUS CORPORATION

TELECON NOTE

CONTROL NO: 02-8810-71

DATE: Jan. 25, 1989

TIME: 10:49

DISTRIBUTION:

IBM- COR.

BETWEEN: Mr. John Bailey

OF: ~~Water~~ Foreman, Village of Wappingers Falls

PHONE: (914) 297-3787

AND: Thomas Varner

YUSI

DISCUSSION:

I called Mr. Bailey to obtain some information concerning the wells used by the Village. He told me 4 wells (another one is capped over the said TV Hts/59) are available for use, but only 2 are used on a steady basis. The other 2 are backup. He said all 4 are about 90 feet deep. He said they are screened in sand and gravel.

TAV 1/25/89

ACTION ITEMS:

YUS 267 REVISED 2581

REFERENCE NO. 16

PRELIMINARY ASSESSMENT
OFF SITE RECONNAISSANCE
INFORMATION REPORTING FORM

Date: ⑪ NOVEMBER ~~DECEMBER~~ 10, 1988

Site Name: IBM - COUNTRY CLUB TDD: 02-8811-71

Site Address: ROUTE 9 (SOUTH ROAD)
Street, Box, etc.

POUGHKEEPSIE
Town

DUTCHESS
County

NEW YORK
State

NUS Personnel:

Name	Discipline
S. KENNEDY	BIOLOGIST
S. ANDERSON	ENVIRONMENTAL SCIENTIST
B. DIETZ	BIOLOGIST

Weather Conditions (clear, cloudy, rain, snow, etc.):

CLOUDY, BREEZY, WINDS FROM THE SOUTH AT APPROX. 13 MPH, TEMP. APPROX. 47°F

Estimated wind direction and wind speed: SOUTHERLY - 13 MPH

Estimated temperature: 47°F

Signature: Susan M. Kennedy Date: 11/10/88

Countersigned: _____ Date: _____

PRELIMINARY ASSESSMENT

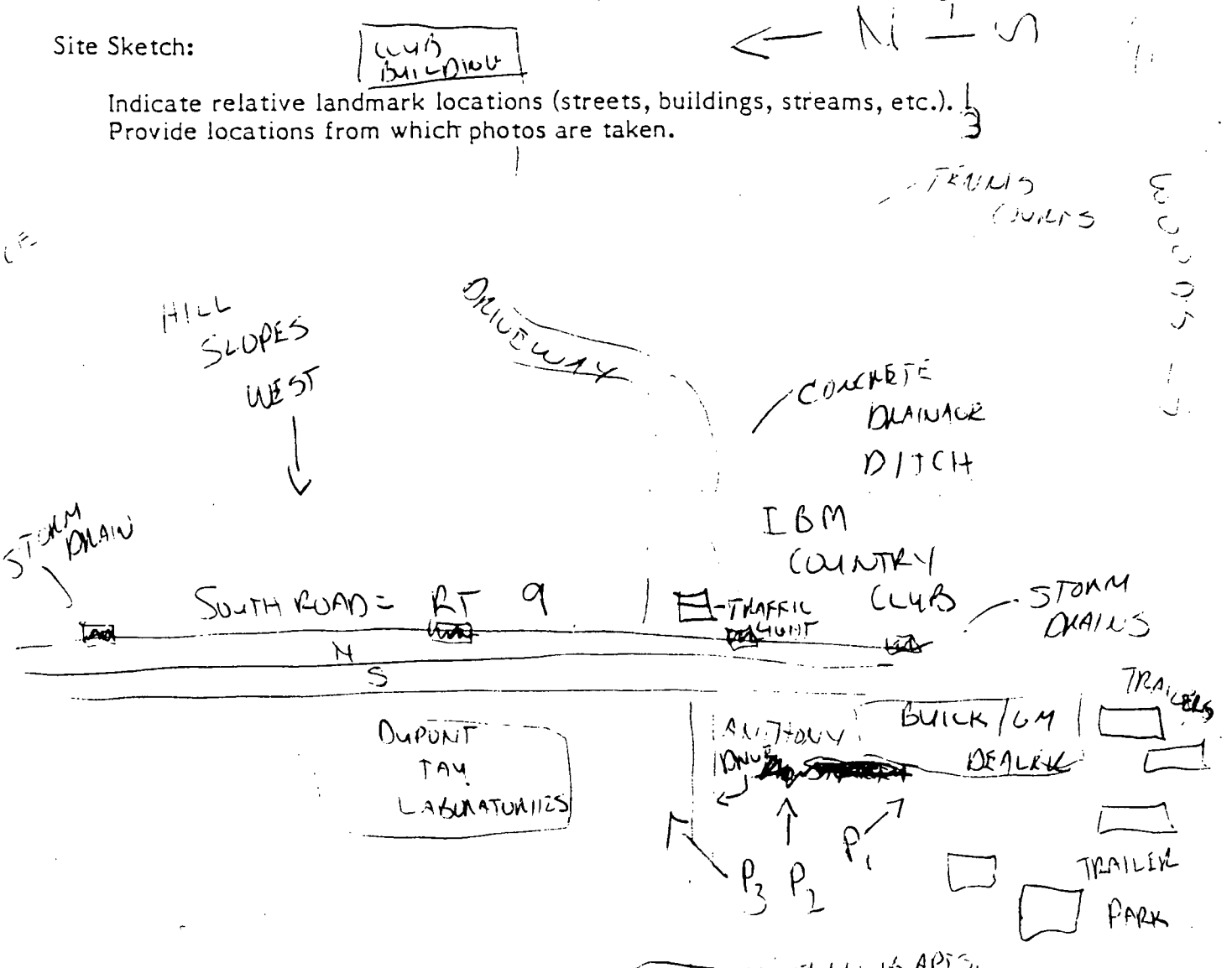
INFORMATION REPORTING FORM

Date: NOVEMBER 10, 1988

Site Name: IBM COUNTRY CLUB TDD: 02-8810-71

Site Sketch:

Indicate relative landmark locations (streets, buildings, streams, etc.). Provide locations from which photos are taken.



Signature: [signature] Date: 11/10/88

Countersigned: _____ Date: _____

PRELIMINARY ASSESSMENT

INFORMATION REPORTING FORM

Date: NOVEMBER 10, 1988

Site Name: IBM COUNTRY CLUB TDD: 02-8810-71

Notes (Periodically indicate time of entries in military time):

0940: COUNTRY CLUB IS ON THE NORTH SIDE OF RT 9 - ACCESS ROAD HAS SIGN STATING "PRIVATE - MEMBERS ONLY" PROPERTY SLOPES STEEPLY TOWARDS THE WEST (TOWARDS RT 9) - BUILDINGS VISIBLE FROM RT 9 ARE LOCATED ON TOP OF A HILL. PROPERTY IS FENCED ON THE NORTHERN SIDE, BUT NONE ON THE EASTERN OR SOUTHERN PROPERTY - COULD BE ACCESSED. CAR DEALERSHIP ACROSS THE STREET;

NEAREST RESIDENCE ON ANTHONY STREET - TRAILER PARK NEXT TO AND EXTENDING BEHIND BUICK DEALER. STORM DRAINS AT THE BASE OF THE COUNTRY CLUB PROPERTY, ALONG RT 9.

COUNTRY CLUB APTS LOCATED ON ANTHONY ST, 1320 FT. FROM INTERSECTION MONITORING WELL OBSERVED ON NORTHERN EDGE OF DUPONT PROPERTY (LABELED #3). TRAILER PARK HAS NO SIGNS TO INDICATE THE NAME OF THE PARK. A CONCRETE DRAINAGE DITCH WAS OBSERVED ALONG THE SOUTHERN SIDE OF THE DRIVEWAY - PARALLEL

Signature: Susan McKenney Date: 11/10/88

Countersignature: _____ Date: _____

PRELIMINARY ASSESSMENT

INFORMATION REPORTING FORM

Date: NOVEMBER [illegible], 1988

Site Name: IBM COUNTRY CLUB TDD: 02-8810-71

Notes (Cont'd):

TO THE DRIVEWAY, DOWN HILL TO DIVERT RUNOFF INTO STORM DRAINS ALONG RT 9 AT BASE OF PROPERTY. THE WOODED AREA TO THE NORTH OF THE PROPERTY EXTENDS FROM SC ALL THE WAY TO COLEMAN PLACE. THERE ARE NO RESIDENTIAL PROPERTIES ON THE SAME SIDE OF RT 9 AS IBM. ONLY THE TRAILER PARK ACROSS THE STREET.

SC

Attach additional sheets if necessary. Provide site name, TDD number, signature, and countersignature on each.

Signature: Susan McKennedy Date: 11/10/88

Countersignature: _____ Date: _____

PRELIMINARY ASSESSMENT

INFORMATION REPORTING FORM

Date: NOVEMBER 10, 1988

Site Name: LOM COUNTRY CLUB TDD: 02-8810-71

Photolog:

Frame/Photo Number	Date	Time	Photographer	Description
P1 S1	11/10/88	0943	KENNEDY	LOOKING SE AT ENTRANCE GATE TO COUNTRY CLUB
	11/10/88			
P1 S2	11/10/88	0943	KENNEDY	LOOKING DUE EAST AT ENTRANCE AND CLUB BUILDINGS
	"			
P1 S3	11/10/88	0944	KENNEDY	LOOKING NE AT PROPERTY-SHOWING HILL TOP

Attach additional sheets if necessary. Provide site name, TDD number, signature, and countersignature on each.

Signature: Susan M. Kennedy Date: 11/10/88

Countersignature: _____ Date: _____